

FEBRUARY 11, 1915

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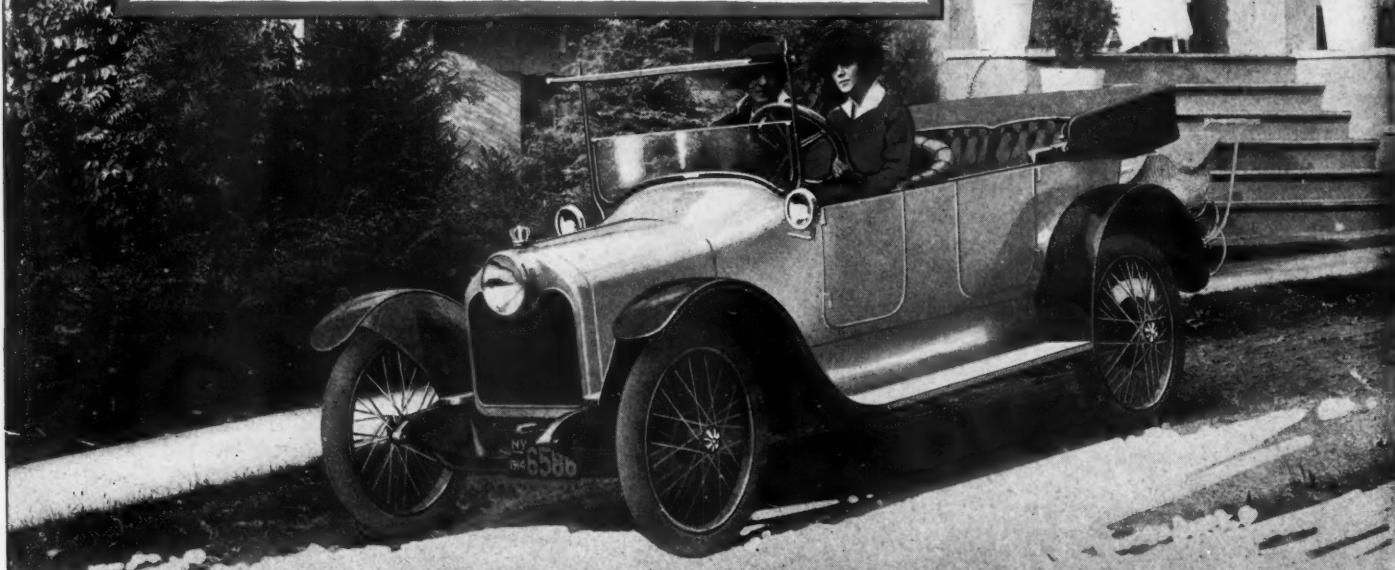
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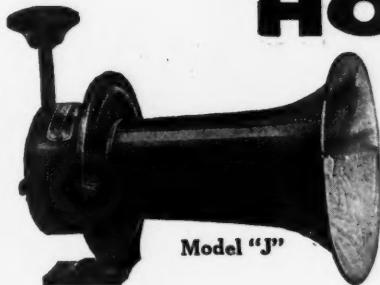
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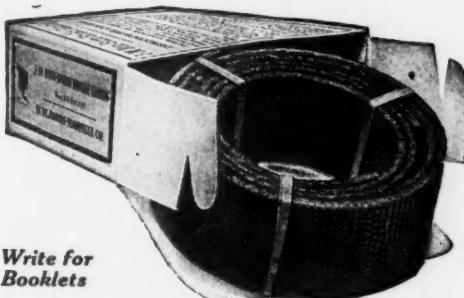
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in Excess of
all Ordinary
Needs

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with your brake lining.
It's the only thing that
stands between you and an
accident when a quick step
is imperative.

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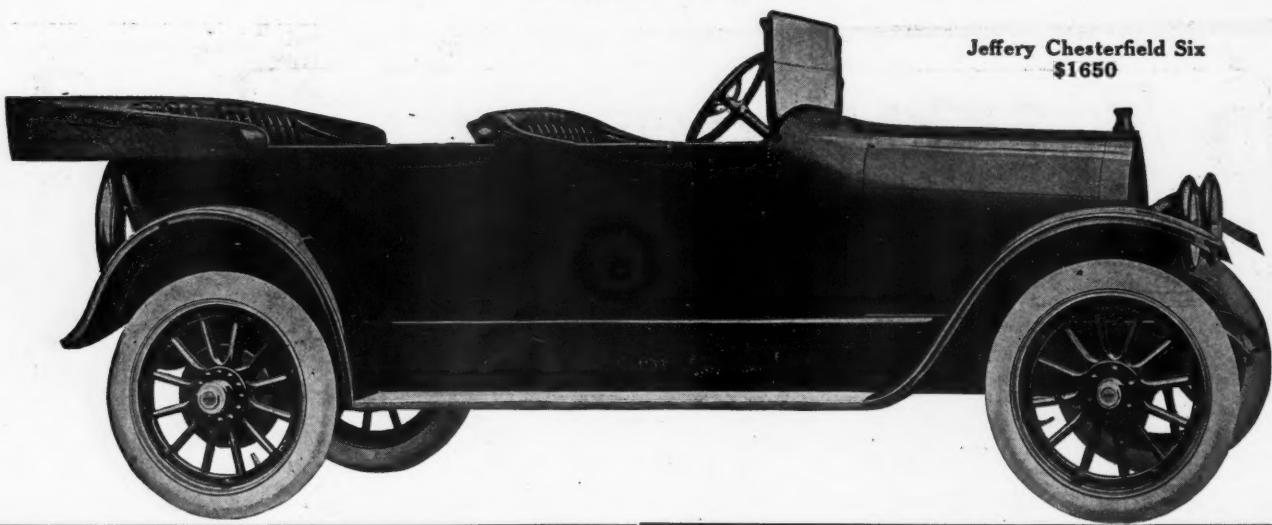
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The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin



MOTOR AGE

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BEWARE OF SOLICITORS, OFFERING SUBSCRIPTIONS AT CUT RATES.

Volume XXVII

February 11, 1915

No. 6

Contents

YANKEE MOTOR SERVICE MAKES AMERICAN HOSPITAL RED	5
CROSS TRIUMPH	5
W. F. Bradley, Motor Age's European representative, tells of the success attained in caring for wounded in the war by means of motor transportation	
MOTOR TRAVEL IN FRANCE DIFFICULT.....	9
Authorities strict in issuing road passes	
EDITORIAL—MINNESOTA'S WHEAT CROP AND THE MOTOR CAR	
—THE AMERICAN RACING SITUATION.....	12
UNCLE SAM FRAMES NEW CODE FOR YOSEMITE VALLEY.....	13
Rules to govern motoring in national park announced	
O'DONNELL IN DUESENBERG WINNER OF GLENDALE RACE.....	14
Elks promote road event and have ten starters	
DECISION RENDERED IN STROMBERG-ZENITH SUIT.....	16
Ruling made in carburetor patent litigation in Chicago court	
MILLION-DOLLAR BID FOR LOZIER ASSETS ACCEPTED.....	17
Winternitz buys Krit company property	
FARMERS ARE CONVERTING WHEAT INTO MOTOR CARS.....	18
David Beecroft writes of the situation in the northwest as disclosed by the recent Minneapolis show	
LEGISLATURES WORKING ON MOTOR BILLS.....	22
Recent measures enacted and discussed	
ACTIVITIES IN THE JITTERY BUS FIELD.....	23
San Francisco announces regulations	
ELECTRIC LIGHTING, CRANKING AND IGNITION SYSTEMS.....	32
Final installment on how the standard types are made and operated	
INDEX TO ADVERTISEMENTS.....	86
DEPARTMENTS	
See America First.....	13
Readers' Clearing House.....	24
Motor Car Repair Shop.....	37
The Accessory Corner.....	38
Among Makers and Dealers....	40
Coming Motor Events.....	40
Recent Incorporations.....	41
Brief Business Announcements..	42
New Agencies Appointed.....	43
From the Four Winds.....	44

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The efforts of the city of Chicago to introduce a jitney bus service as a means towards solving the transportation problem are to be told in the next issue of Motor Age by Montague Ferry, commissioner of public service of the city of Chicago.



Good Upholstery Sells Many Cars

Car buyers today are demanding more in the way of comfort than ever before. They are awakening to the fact that the only part of a car installed *solely* for comfort is *upholstery*. Good upholstery is coming to be a tremendously important sales factor. We are educating car buyers to insure their comfort by demanding

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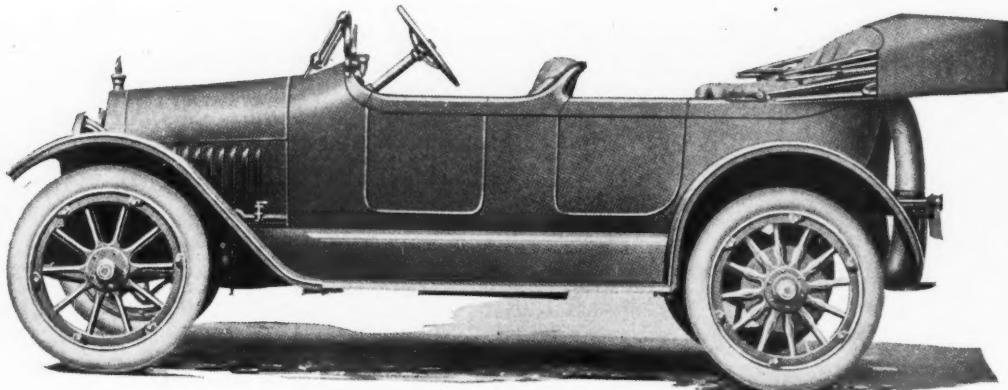
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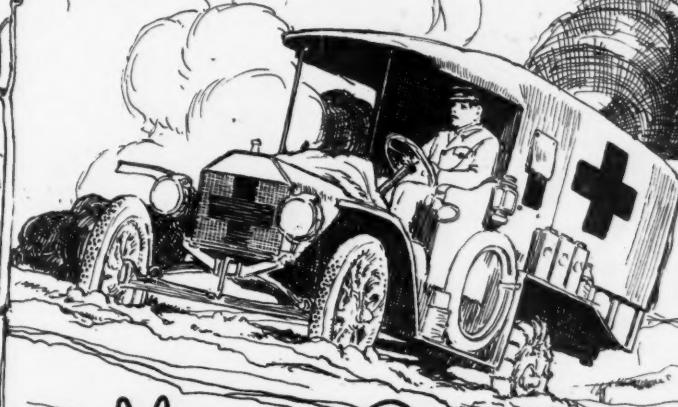
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MOTORAGE



Yankee Motor Service Makes American Hospital + A Red Cross Triumph

by • • W. F. Bradley

Of particular interest to non-combatants on this side of the Atlantic is the American hospital, which has its headquarters in Paris, and which is doing such noble work in Red Cross service on the firing line in Europe. Mr. Bradley's information as to this work is gathered first-hand and will give Americans an opportunity to find out authoritatively how Yankee cars are performing under fire

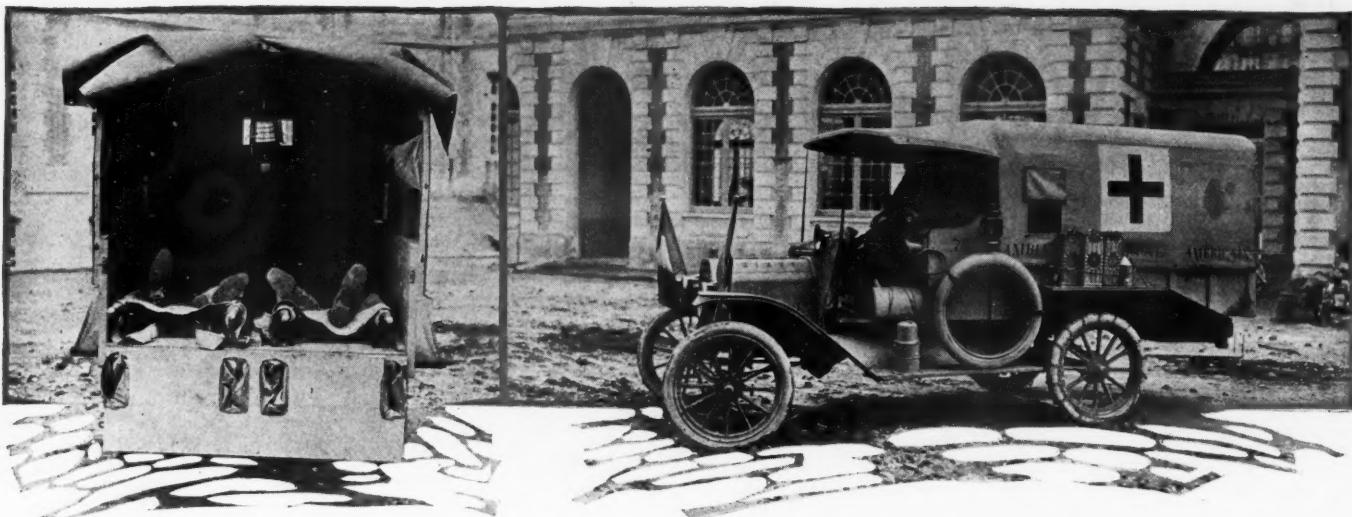
PARIS, Jan. 20—When the war trumpet had sent national institutions tottering, when the railroads and highroads were monopolized by men going forth to fight, when American tourists were struggling to escape from a country in which their dollars and their check books had become so much trash, when all Europe was shrieking and benumbed at the pestilence which was about to fall upon it—at that moment a group of American citizens in Paris rolled up their sleeves and prepared for the grim work they saw just ahead of them.

The modern and scientifically-equipped American hospital at Neuilly formed the nucleus and an almost completed high school building in the same suburb of Paris provided the necessary extension for an army hospital. As quickly as if the dinner bell had sounded, the men in that high school building had dropped their tools to take up rifle, lance, or machine gun. But for them there was no after-dinner return. Their work was not sufficiently advanced to make the building fit for the youth of France, but it was in such a condition that the bare halls could be quickly transformed into wards and offices. With plenty of hard work, American good-will, and the necessary financial backing, the unfinished Lycee Pasteur, abandoned by its workmen transformed into soldiers, was, in a few days, a military hospital with accommodation for 900 men.

A civil hospital might exist without motor cars; to a military establishment they are as necessary as the steam to a steam engine, the clients to a store, the water to a mill. During the moments when nations are switching over from peace to war, motor cars are valuable and scarce. The American hospital committee discovered its first motor cars at the Paris branch of the Ford company. But they were not ambulances, and to make them into such the Ford company employed the cases in



W. F. Bradley



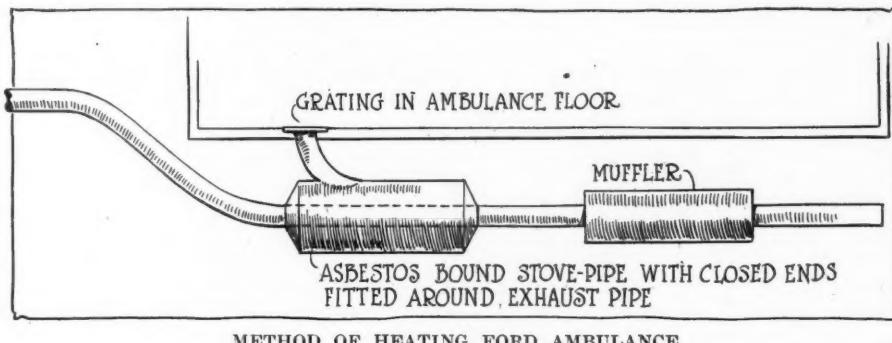
THE ILLUSTRATION TO THE LEFT SHOWS HOW TWO WOUNDED SOLDIERS ARE CARRIED ON ARMY STRETCHERS IN AN AMERICAN AMBULANCE. NOTE THE POCKETS IN THE TAIL BOARD TO RECEIVE THE ENDS OF THE STRETCHERS. TO THE RIGHT IS SHOWN ONE OF THE ORIGINAL FORD AMBULANCES, NICKNAMED SUSAN, WHICH WENT THROUGH 3 MONTHS' FIGHTING FROM THE BATTLE OF THE AISNE TO THE BATTLE OF YPRES, HANDLED BY H. B. RICHARDSON AND A. G. CAREY, OF NEW BRUNSWICK, N. J.

which the cars had been brought from America, and even tore up some of the flooring of their cinema theater.

Strong Organization Formed

From that hasty beginning a wonderful organization has sprung up. It would be more correct to say has been built up, for motor car organizations, whether they be ambulances or factories, can only be brought into being by persistent and conscientious work. At the present moment there are attached to the American hospital in Paris about 100 motor ambulances. Fords predominate; their companions are English Daimlers and "Jumbo," an eight-cylinder de Dion-Bouton with a horse van body—but instead of racehorses it carries wounded soldiers.

A staff had to be got together. America supplied it before it was asked for. That



METHOD OF HEATING FORD AMBULANCE

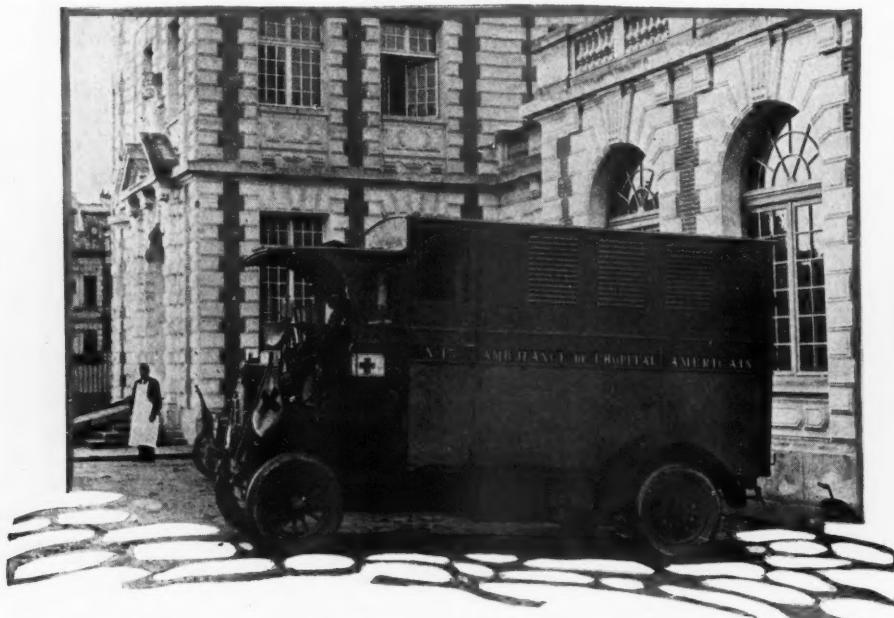
list of names in the office of the captain of ambulances is worth looking over. Alphabetical classification puts at the head an ex-governor of Porto Rico; he is followed by an ex-assistant secretary of the treasury, the son of a well-known cot-

ton king, ex-army officers, Harvard men. The paid workers might be counted on the fingers of one hand; the men who are driving cars as well as those who are sweeping wards, washing wounds, and preparing bandages come from homes of luxury and an environment of wealth.

Fords Prove Their Worth

A Ford does not appear at first sight to be the best type of machine to make into an ambulance. One of the officials admitted that he considered it fit to decorate the landscape. The captain of a section, who took the trouble to explain that he ran a big car at home—a Simplex, a Packard, or a Pierce—said, "I have been on this job since August, but I have yet to see a Ford that failed to get there." Tommy Atkins, who has done much to increase the world's vocabulary since this war began, has hit upon a happy expression. The British soldier was wounded; he was making his way to the rear as best he could, when a Ford from the American hospital came dancing down the greasy, granite-paved, mud-bordered highway. It jumped off the paving stones into the mud bath, and from the mud bath back to the paving stones; it slipped past convoys and worked its way past wrecked machines; finally it pulled up in front of the Britisher.

"Blime if that ain't another of them bleomin', bleedin', jumpin' bedsteads,"



JUMBO, AN EIGHT-CYLINDER DE DION-BOUTON WHICH FORMERLY TRANSPORTED RACEHORSES. THIS IS CAPABLE OF HANDLING EIGHTEEN MEN AND IS INVALUABLE FOR QUICK EVACUATION WORK

remarked Tommy as they lifted him aboard. And "jumping bedsteads," with as many adjectives as imagination can supply, the Fords have remained until this day.

How these cars were brought up to a state of perfection is a story of some interest to motorists. Before it can be told some explanation must be given of the work the cars have to do and how they do it. Although the hospital is a private institution, the entire organization is under military control. Every motor car carries a military number and every driver is almost as much under military control as the Englishman who has taken the king's shilling, or the conscript owing allegiance to France. In the earlier stages of the war, particularly when Paris was threatened, the ambulances made out and home trips from the hospital to the battlefield. They picked men up where they had fallen and brought them direct to the hospital in the suburbs of Paris. Now that is changed.

Work of Cars Varied

The firing line is some distance away and the cars are sent out in sections and squads, to remain in the field for any period from 3 weeks to 3 months, to work under army directions, while at the same time maintaining their individual organization. The work is varied. It may be taxicab service in some town 50 miles from the battle line; it may be picking up wounded practically on the battlefield and carrying them to the field hospitals; it may be the removal of sick and wounded men from the field hospitals to the base hospitals or to the hospital trains some miles back.

The work is as exacting as it is varied.



SECTION COMMANDER'S CAR EQUIPPED FOR THE ROAD. NOTE BIG TOOL BOXES, RESERVE GASOLINE ON FENDERS AND BOXES, BIG HEADLIGHT AND WATERPROOF COVER OVER TONNEAU

At any moment the hurry-up call may come at any moment, and when it comes men and machines must be ready to start off for a run which may be from 50 to 250 miles, and for service which may last a few minutes or a few hours. It is not infrequent for men and machines to be kept going continuously for 18 hours without the motors being stopped.

A squad consists of five ambulances, a supply car and a touring car. A section is made up of two squads, or twelve vehicles, ten of them being ambulances and two respectively a supply car and a touring car. In the majority of cases the ambulances work in sections, for these are absolutely self-contained, carrying with them all necessary parts to meet every possible emergency, and requiring nothing more in the way of outside supplies than gasoline and oil to keep them running indefinitely.

Each ambulance is built to receive a couple of army-type stretchers, or to carry

four wounded men sitting, thus making with the driver and attendant—a maximum load of six men. It is a rule to carry four orderlies for six ambulances. Owing to the small dimensions of the vehicle it has not been an easy matter to fit up the Fords in a satisfactory manner. The body is of wood and canvas, with the canvas fastened down permanently all round except at the rear. Here there is a hinged tail board with canvas curtains above if fastened by turn-screws. There is a considerable amount of overhang, and the army stretchers are a little longer than the body. Thus four holes have been cut in the tailboard and canvas bags fitted

over these. This allows the ends of the stretchers to project, but prevents cold air entering. When men are sitting on the transverse benches hooked to the side panels, they have a tendency to get to the rear, in order to look out, thus upsetting the balance of the car. This is overcome by fitting a mica window on each side forward; the men move upwards to look out of this and in doing so evenly distribute the load.

Heating the Ambulances

As soon as the cold weather set in, the French army asked for heated ambulances. The American hospital tried to meet the want, and after some experimenting produced a simple heating apparatus of such efficacy that the Ford was dubbed by French soldiers "L'Hotel du Courant d'Air—Chaussage Central" (Drafty Hotel—Central Heating). Mr. McFadden, one of the voluntary workers who tackled this job, fitted a stove pipe around the exhaust pipe, closed up the ends, bound it with



TO THE LEFT, A FORD SUPPLY AND REPAIR CAR WITH CANVAS SIDE EXTENDED TO FORM A ROOF, AND SIDES OF LOCKERS RAISED TO FORM A WORKSHOP. TO THE RIGHT, THE SAME CAR, SHOWING SOME OF THE CUPBOARDS OPEN



A COMPLETE SECTION OF THE AMBULANCE SERVICE, WITH SECTION COMMANDER'S AND SUPPLY CAR, READY TO LEAVE FOR THE FRONT

sheet asbestos, and carried a lead from the stove pipe through the floor about level with the heads of the men lying in the ambulance. The opening is covered with a grating. This arrangement will raise the temperature of the ambulance 17 degrees in half an hour. It supplies pure hot air, and has the advantage of costing but \$4.

One of the objections to the Ford was the use of odd-size tires. The ambulance people finally discarded the 3-inch tires on front wheels in favor of 3½-inch; they thus avoid carrying two size tubes and casings, an important matter when every ounce of weight has to be considered, they obtain better tire service, and according to some of the drivers the cars are easier to steer. The lighting outfit had to be simplified; originally there were too many bends in the pipes and no provision for drawing off water. Electric lighting was tried and abandoned, the experience of the ambulance people being that it is unsuitable. Further, the British army authorities refuse to allow any car to be in service at the front with electric lighting only. If electric lighting exists it must be supplemented by gas.

Spares Carried on the Car

Each car carries two spare casings; either on the left hand running board or on the roof extension above the driver's head. Spare tubes are contained in a box at the driver's elbow. The gasoline supply for each car is 35 liters or 7.7 gallons in tank, and 30 liters or 6.6 gallons in reserve. This reserve supply is contained in six cans, three on each rear fender; in addition a small supply of kerosene is carried for side lamps and a reserve of 2 gallons of lubricating oil. This reserve supply must always be maintained. In this way the ambulances are ready to respond to every call for a distance of not less than 250 miles without any outside supplies being needed. Under the canvas apron, which

replaces the glass windscreen, every driver has a bottle containing sterilized water, and a military kitchen with all eating utensils.

The touring car and supply car which travel with every section are marvels of ingenuity. All jimmerack ideas have been driven out by the stern realities of war, and the touring car can handle all the kit and food of the men in its section, while the supply car has enough spares to build a complete Ford car.

The problems in the supply car were to have the load distributed so that the weight should be carried with the least possible strain, to make every spare accessible, and also to render control of the stock easy. This car carries a radiator, cylinder casting, set of pistons, rear axle, spare wheel, steering levers, and a stock of small parts usually only to be found in a motor car store. The general arrangement, for which Fred B. Bates is responsible, is shown in the illustrations.

Boxes for spare parts are built all around the car in such a way as to get the load well centered and as low as possible. The body is of wood and canvas, with the canvas sides capable of being extended and held up by props so as to form a convenient workshop. Within the body are shelves receiving metal boxes for such articles

as bolts, nuts, gaskets, nails, screws, spark plugs, etc. Every cupboard is numbered and a list maintained of every article in each cupboard. As a note is made of every part given out to drivers, the keeper of the supplies knows exactly what stock he has in hand and can supply any part at a moment's notice.

Equipment of Car Carrying Parts

The touring car bears a closer resemblance to a Ford, for the original body has been maintained, but instead of passengers being carried at the rear, this is filled with the men's kit and covered with a heavy waterproof which also encases the top. The running boards are lost under big tool and spare parts boxes, the tops of which are fixed and the sides hinged. This is a detail which has its importance in wet weather. This car is fitted with a power-



SEVERAL OF THE FORD AMBULANCES ATTACHED TO THE AMERICAN HOSPITAL IN PARIS

ful marine-type searchlight mounted on the dash; it is used to facilitate explorations when traveling at night in a strange country. It will be seen from the illustration that a 2-gallon can of gasoline is carried on the top of each front fender.

It will be asked what are the mechanical troubles which develop with this type of machine. They are surprisingly small. Spark plugs give a lot of trouble; under the heavy going brake bands fail more frequently than in normal service. But this is about all. The accurately-kept list of spares supplied to a section of twelve cars which had been at the front for 8 consecutive weeks showed nothing more important than a set of steering levers (damaged in a collision) hub caps, gaskets, spark plugs, switch keys, headlight burners, tail lamps, and brake bands.

Most Cars at the Front

The war has reached such a stage that it is necessary to keep very few ambulances at the hospital in Paris. The captain of ambulances is striving to keep his whole fleet in the field, under the direction of the military authorities. When a section comes back—it may be after a couple of months' constant service—it is repaired, overhauled, given fresh supplies, and sent back into the field. The firing line now is too far away for men to be brought in direct to the hospital. The wounded are taken from the hospital trains coming to the outskirts of the city, or from the regulating hospitals surrounding Paris. Only a few of the larger type ambulances are required for this work.

The men who go out with the sections for the front have little or no knowledge of their destination. It is one of the rules in army service to ask no questions. They may be bombarded out of villages, they may collect shrapnel in their wooden panels, the garage may be a public square and the hotel a barn or a stable—but everybody is satisfied and every man is willing to meet the calls made upon him by the sick and wounded.

FRENCH CLUBS HELPING

Paris, Jan. 22—Within a period of 14 days the Automobile Club of France has delivered 286,660 pounds of woolen goods to the French troops in the first line of defense. Among this quantity were 36,800 packages addressed to individual soldiers. Most of the deliveries were made by motor car, the French club maintaining a constant service between Paris and various parts of the firing line. The work of supplying French troops with warm clothing is being continued by the A. C. F.; gifts in money and goods are being received from France and abroad, and the club has purchased a large quantity of wool for making into gloves, mufflers, etc.

The Touring Club of France has undertaken a similar work, with the approval of the army authorities, and is specializing itself in warm footwear for men in the trenches.

Motor Travel in France Difficult

Authorities Strict in Issuing Road Passes

By W. F. Bradley

PARIS, Jan. 23—Early in September the German army entered the town of Senlis, 24 miles northeast of Paris, and, claiming that shots had been fired by civilians, fired all the buildings in the main street. A few days later the retreating French and British forces were pulled up smartly by General Joffre, faced round, and told that they were to fight and win, or die on the spot. They routed the German armies, driving them back to the Aisne, a distance of nearly 30 miles. The

able to make the 25 to 40-mile run from Paris to Senlis and the battlefield of the Marne might be counted on the fingers of one hand. Those battles were great victories for the French; they were fought more than 4 months ago, the districts are now cleared of troops, the wreckage has been gathered up, the dead all have been buried, the wounded all have been evacuated—yet to make a motor trip into this neighborhood is more difficult than a mid-winter journey from New York to Seattle.



ENGLISH DAIMLER ATTACHED TO THE AMERICAN HOSPITAL IN PARIS

various centers of that series of battles on the Marne, in which probably 2,000,000 troops were engaged, and where the dead and wounded were counted by thousands, are from 20 to 40 miles due east of the city of Paris.

If half the town of Trenton, N. J., had been burned by an armed force; if one of the world's greatest battles had been fought but a few miles to the east of Brooklyn, it can be imagined that the civil and military authorities would have a difficult task to keep New Yorkers away from such spots. If the railroads and trolley car services were cut off, there would apparently be nothing to prevent motorists going out; indeed, the man who owned a motor car might be expected to be the first and the most persistent visitor to the places which must loom big in the history of nations. But a supposition as to what would doubtless happen around New York gives no indication as to what really has happened around Paris.

The civilian motorists who have been

This is the negative side of the motor car in warfare, and one which is as carefully studied and as minutely organized as the positive application. The motor car, and by that term is meant any self-propelled vehicle from a 1½-horsepower motorbike to a 5-ton truck, is such a valuable weapon that it cannot be allowed to go to waste; it is such a dangerous instrument that it cannot be put on the road unless hedged around by a thousand rules and regulations.

Motor travel never has been absolutely forbidden in France, but it has been subjected to such restrictions that the man who is willing to undertake it must be possessed of more patience than the early enthusiasts who went from New York to Philadelphia in 3 days and were proud of the feat. In the early days, or rather the early hours, of the war, every village and hamlet in France formed a guard for the protection of the roads. They were old men and boys, armed with every kind of arm from a shotgun to a modern army

rifle, and they went on duty within a few hours of the order for mobilization. Sometimes they used their rifles first and asked for explanations afterwards. Such accidents were too trifling to get in the newspapers, even if there had been no censor to keep them out.

Such a system produced fussiness, not efficiency. It held back soldiers who were entrusted with urgent life and death messages, and it let through the skillful spy and the idler who had a pull with some local authority. Now all that is changed. There are plenty of men who have a pull, but they invariably find that there is nothing at the end of it. Nearly 6 months' war experience has been sufficient to put the army authorities wise to all the subterfuges for securing motor car permits, and to reduce the travelers by road to the lowest number and hold them to the narrowest and most restricted area.

Worried by Newspaper Men

Newspaper men gave the greatest trouble. They had influence with the police, with the civil authorities, with army officers, and as the Frenchman considers the law is made for the other fellow, they found means of making use of cars. By an unfortunate accident half a dozen Paris newspaper reporters happened to pull up their car in the midst of a group of staff officers who were studying maps. General Joffre was in that group, and although the commander in chief of the allied forces has a reputation for self-restraint, he saw red for a few moments and issued orders which have made even newspaper men hesitate before driving into the war area. A group of American and English war correspondents, trading on their influence with the ambassador, secured a valid military pass to travel in a Packard car to the scene of operations. Chance took them into the village occupied by the general staff of one of the British armies. They were arrested, imprisoned in a barn, their car retained for army service, and at the end of a week released on a promise that they would not write anything for 6 days.

It seemed an easy matter for newspaper men to loan their cars to the Red Cross organizations, or to offer their services as stretcher bearers to the convoys going to the front. Some time ago this was frequently done; but the army became wise to the move. Now the officials of the various Red Cross organizations are scared of their own shadows. A man who offers a car is first of all looked upon with suspicion. When the Red Cross authorities are convinced of his good intentions, detectives pry into his life's history, and if he should have had any connection with newspapers, if he has written a magazine article, if he has sent a letter to the Times, if he is 90 degrees removed from a German family, they decide to take no chances. One prominent English newspaper man slipped on overalls and visited the battlefield as a mechanic on a Red

Cross car. He wrote a story of his experiences, but next day found it prudent to remove into Russia.

Every motorist in France is registered with the police and carries a police driving license bearing his photograph, place of birth, age, residence, etc. This, however, is only a peace time precaution. Such a measure is altogether insufficient when the nation is at war. In Paris and district no man is allowed to travel by motor car until he has secured a special pass from the police. The ordinary pass allows him to travel in the Seine et Oise district, or about 8 miles east of the city and 30 miles in a westerly direction. This pass must be renewed every fortnight; it mentions the number and sometimes the names of the persons who can travel in the car; it is examined by the police every time the driver passes through the gates of Paris; it is called for from time to time on the road; and if used for any other than the area indicated the car may be confiscated.

To travel further afield the motorist must pass through an even finer sieve. Passes are given only for a clearly defined journey, either out only, or out and home. Permission is not given to travel about from point to point. Such application is considered on its merits. If it is for the south, the west, or the southwest, far removed from the army operations, there are few difficulties. But if it is for any part of the army zone, strict inquiry is made first by the civil, then by the military authorities; every occupant of the car must be presented, and the photograph and signature of each one must appear on the pass.

Fuel Hard to Get

The obtention of a pass for the army zone does not remove the difficulties, for gasoline is inaccessible to all but military motorists within the military territory. Benzol can be supplied only to firms working on army contracts. There does not appear to be any shortage, and if price has increased it is due to higher freight, but the war department has no intention of carrying gasoline to the front for the benefit of civilians.

The grip on the non-fighting motorist is extended to the military man. No soldier can take a car out until he has received a written and stamped order from his superior. At the gates to Paris and the entrance to every important city a guard is maintained to examine soldiers' passes. This restriction puts a stop to joy riding and makes it impossible for the military motorist to extend courtesies to his friends.

The arming of the greater part of the male population of France has caused a shortage of drivers. Elderly men who never had thought it necessary to learn to drive a car are now taking lessons, and garage proprietors who have lost most of their ordinary business are gathering in a little money by giving instruction in the

handling of cars. French women never have been great motorists, but with the husband, the sons and the chauffeur at the war, the women folk have had to learn to drive a car, to wash it and to keep it in trim.

Not all the motor cars in France have been seized for war purposes, but there is not a car unaccounted for. Under heavy penalties every owner of a car was obliged to declare its possession at the local city hall on the first day of January. In the towns near the firing line every garage proprietor or person to whom a car had been entrusted had to notify the military of the existence of the car under penalty of its confiscation and a fine. As the cars cannot be taken out of the immediate district in which they are owned, except under a special permit, as each permit must be returned to the issuing authority, and as a written record is maintained of the passage of cars along the high roads, the elusiveness of the motor car is destroyed. To the man who has no military obligations, but has business necessitating constant travel, the restrictions are irksome. They are wonderful testimony to the value of the motor car, and it is doubtful if anything but a war could have made the French nation appreciate cars as it appreciates them at the present moment.

ADVICE FOR TRUCK MAKERS

London, Jan. 22—Admirable efforts are being made by many American truck and tire-making firms to firmly establish themselves in this market, but it is declared to be rather poor policy for many firms to spend money on such enterprises unless they are marketing the kind of merchandise that is wanted in this country. There could not be any more opportune time to establish truck agencies or branches, but these vehicles must follow conventional European lines, having the motor under a forward hood or bonnet. It is practically useless to attempt to market trucks with motors under the floor boards, as this type of vehicle is not popular in England. Gasoline trucks of 3, 4 and 5-ton capacity are much in demand here at present.

Electric truck makers, who are going to attempt the British market, would be better off by opening branches than agencies. The Britisher here knows very little about electrics and is not even familiar with their good selling points. It will take some time to introduce them.

Previous to the war approximately 65 per cent of the solid tire business was done by German firms and there is no more opportune time for American makers of tires to get established, providing they build the solid-base tire. The squat-section solid tire that has been offered by several American makers is not quite suited for London, a deeper section being preferred. As the German business in this country has ceased, and will not be renewed after the war, the opportunity for Americans is particularly suitable.

Many Big Tire Concerns Revising Their 1915 Prices

Substantial Reduction Made in Nearly Every Case

NEW YORK, Feb. 9—The tire situation is clarifying itself and in the process tire lists quite generally are touching new low levels. Since the Goodrich company announced its new list and the abolishment of percentage discounts in favor of established list prices to the user and net prices to the dealer, half a dozen other makers have revised lists and in practically every case the new figures are lower than the old ones.

In the majority of cases, manufacturers have not as yet made definite decision with regard to revisions though it is admitted that these are being considered. Among those which are considering this are Swineheart, Thermoid, Empire, which reports that it probably will meet the general reduction, and Lee.

The reductions which have been announced are substantial in every case as is revealed by the accompanying table, and they apply not only to plain treads but to non-skid treads and to tubes as well. Although the reductions which have been made to apply in nearly every case to all sizes, in at least one case a reduction has been made only in casings 4 inches in diameter and over, no change being made in tube prices. This is the Kelly-Springfield company which has reduced 4-inch casings 10 per cent and 4½ and over casings 12½ per cent. At the same time, an important readjustment of mileage guarantee has been made, which is best explained in the company's own words:

"We are going to allow our dealers and distributors to increase the adjustment feature on our tires to 6,000 miles on plain tread and to 7,000 on our Kant-Slip tire, in the Ford sizes. We will adjust on a basis of 5,000 miles for all plain tread tires 4 inches and above; and 6,000 miles on the Kant-Slip type."

The companies which have as yet made no announcement include: Batavia, Federal, Miller, Falls, Republic and some others.

It is expected that before another week the whole matter will have been settled by the tire companies.

BIG JITNEY MOVEMENT IN K. C.

Kansas City, Mo., Feb. 10—Special telegram—Two hundred jitney buses were registered in this city ending yesterday and more are being registered every day. Fourteen new ones came on yesterday. At a meeting of the jitney association this week it was voted to issue a small booklet of routes and schedules which will be distributed next week. The crowds of passengers using jitneys each day is increasing largely, due to their operating over definite schedules.

The money possibilities of jitneys seem unlimited. One Kansas City man who had not used his car for several months, hired a chauffeur and put the car in jitney service. The first day he made \$9.60. Others hearing of his success, started out with their cars, so the movement is growing.

Omaha now has twenty-five jitneys and more are being added. The majority of

them are touring cars, with top and side curtains up. The word "Jitney" is written across the windshield in large letters. One Omaha dealer is having designed a special bus body for his regular chassis to be used in jitney service.

RECEIVER FOR TWOMBLY

New York, Feb. 9—F. W. Stelle has been appointed receiver for the Twombly Car Corp., with the power to continue business or to close up any of the establishments of the company. The appointment was made on application of D. Stuart Dodge, president and financial backer of the company. Mr. Dodge has advanced \$114,439 to provide funds for pay rolls and other expenses. He is the largest creditor. Outside of his claim, which amounts to \$468,238, the liabilities will not exceed \$10,000, to about seventy creditors. The tangible assets, it is asserted, do not exceed \$35,000, aside from the patents and interests in contracts with W. I. Twombly, the inventor, which are uncertain value.

Mr. Dodge in the petition, filed in the United States district court, stated that he was the financial backer of the companies, which included the Twombly Power Co., Twombly Motors Co., Twombly Taxicab Co., Inc., and the Twombly Car Corp., all of 1790 Broadway, this city. He also stated he had no security for the above amount of money.

Truck Exports Increase

WASHINGTON, D. C., Feb. 9—Special telegram—The demand for trucks for European war purposes is indicated in the export figures issued today by the bureau of statistics. In December last, 1,279 commercial cars, value \$3,387,729, were exported, together with 1,297 pleasure cars, value \$998,698. In December, 1913, eighty-eight commercial cars, value \$100,660, and 2,301 pleasure cars, value \$2,052,484, were exported.

During the calendar year the number of commercial cars exported increased from 1,009, value \$1,686,807, in 1913, to 3,430, value \$8,985,756, in 1914 while the number of pleasure cars decreased from 25,880, value \$25,343,644, to 22,335, value \$19,521,708, during the same periods.

STUDEBAKER EARNINGS \$4,000,000

South Bend, Ind., Feb. 6—The Studebaker Corp., of this city and Detroit, is reported to have earned \$4,000,000 in 1914. The exact figures are not available as yet, as the financial report is still in the hands of the accountants. After taking out the \$900,000 for the preferred stock dividend, \$3,100,000 is left for the common, or approximately 11 per cent on the \$27,931,600 outstanding. This compares with \$1,003,338 or 3.59 per cent for the common in 1913.

TABLE SHOWING PRICE REDUCTIONS MADE BY THE TIRE COMPANIES

Name	30x3		32x3 1/2		34x4		36x4 1/2	
	Old	New	Old	New	Old	New	Old	New
Braender	Plain	\$11.70	\$9.00	\$16.75	\$13.35	\$24.35	\$19.40	\$35.00
	Non-skid	14.05	10.35	22.10	15.35	29.20	22.30	42.00
	Tube	2.80	2.35	3.70	2.80	4.90	4.00	6.45
Firestone	Plain	12.30	9.40	17.60	13.75	26.20	19.90	36.75
	Non-skid	14.60	10.55	21.20	15.40	30.50	23.30	41.90
	Tube	2.80	2.20	3.70	2.70	4.90	3.90	6.45
Fisk	Plain	12.30	9.00	17.65	13.35	25.65	19.40	36.85
	Non-skid	13.30	9.45	19.05	14.00	27.40	20.35	39.05
	Tube	2.95	2.35	3.90	2.80	5.15	4.00	6.80
United States	Plain	11.70	9.00	16.75	13.35	24.35	19.40	35.00
	Chain tread	14.05	10.70	20.10	16.00	29.20	23.95	42.00
	Tube	2.80	1.85	3.70	2.80	4.90	4.00	6.45
Goodyear	Plain	11.70	9.35	16.75	13.95	24.35	20.35	35.00
	Non-skid	13.70	10.95	19.60	16.30	28.50	23.80	40.95
	Tube	2.50	2.35	3.70	2.80	4.90	4.00	6.45
Kelly-Springfield	Plain	15.20	15.20	21.20	21.20	30.50	27.45	39.77
	Non-skid	18.10	18.10	25.30	25.30	36.90	33.55	46.57
	Tube	3.20	3.20	4.40	4.40	5.65	5.65	7.50
Ajax	Plain	12.65	9.60	....	....	26.30	20.65	37.85
	Vacuum cup	10.80	9.40	22.90	20.35	32.15
Pennsylvania	Plain	14.40	13.00	34.00	28.95	46.35

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Minnesota Wheat and the Motor Car

THOSE whose business and motoring activities confine them to the city boulevards and parks little realize that the constant stream of vehicles passing and repassing before their eyes represents the smallest proportion of the yearly output of the motor car factories. An eye-opener is in store for such of them as should penetrate the wheat belt of the country. One is quite apt to think that with the closing of the New York and Chicago motor shows, the barometers of the industry, have spoken finally, but it remains for such of the so-called minor exhibitions, as those at Minneapolis and Kansas City, to indicate accurately the pulse of that most dominant factor in the industry, the farmer.

■ ■ ■

SVENTY-FIVE to 80 per cent of the motor car sales of the Twin cities and the great northwest that St. Paul and Minneapolis serves, are to farmers, men whose prosperity and whose motor car demand depend directly upon the wheat crop and the price it brings. There are nearly 400,000 of them in Minnesota alone and of these fewer than one-tenth own cars; but nearly every one of them is a prospective owner possessed of the desire, and soon to be possessed of the ready cash. It is stated that at least one-half of the entire annual motor car output of the country could be sold in that state for the next year or so.

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THE farmer in the wheat belt has more money this year than he ever possessed before. Abundant crops of grain and

the unprecedented price it commands means that Minnesota and the two Dakotas are \$140,000,000 richer than they were last year at this time. In the face of the fact that the number of cars in these states increased 50 per cent last year, what is to be expected for the coming season? Those manufacturers who intelligently prepare to meet the call of the northwest for cars with a product of standard value will find their sales limited only by their ability to turn them out and make deliveries on schedule.

■ ■ ■

STRONG as the demand from this territory promises to be, it will not be a demand that can be satisfied by vehicles not adapted to the particular needs of the territory. The farmer is the last man to whom mechanical gold brieks in the shape of unsuitable cars can be hoped to be sold. He knows value in machinery, whether it be a berline or a binder, a touring car or a threshing outfit, six-cylinder or a cyclone blower. Mostly, he prefers a five or six-passenger touring car of medium power and of low or medium price. There is little race suicide in the Minnesota wheat fields or the prairies of the Dakotas. Roadsters, consequently do not have the wide demand that they have in the apartment districts of the city. Roads are sometimes heavy and hills steep; power, therefore is a factor. Manufacturers are studying the needs of this territory and would do well to give it even more attention, in view of the probable increase in demand, whose first impulses already are beginning to reach the manufacturing centers.

The Racing Situation in America

ONE can wax optimistic as to the motor racing outlook in this country for 1915, for with the abolition of horse racing, the legislation affecting prize fighting and the hard sledding baseball is having because of the activities of the Federals, the great American public is turning elsewhere for its sports and finds that motor racing just about fills the bill. Because of its established popularity it can be said without risk of denial that motor racing has become a major sport.

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ALREADY the investment in tracks specially designed for motor racing is tremendously heavy and the end is not yet. Indianapolis is the bell wether so far in leading promoters to invest money in speedways and the example of the Hoosiers will be followed by several others, so that it looks as if there will be at least a half-dozen speedways in operation inside the next year. Omaha has its board track nearly done; Chicago has begun work on a 2-mile track; Sioux City already is provided with a track which is made of dirt; Tacoma also is in the speedway class; while it looks as if considerable dependence can be placed in the announcements by Minneapolis, New York, Kansas City and Philadelphia that they will have special tracks for motor car racing.

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THIS activity includes only those backing speedways but it does not mean that the general activity ceases here. The road racing end of the sport is fully as important and perhaps a little better established. Already there have been two important meets in California—San Diego and Glendale—while

this month San Francisco will stage the Vanderbilt and grand prix. Next month there will be another major league event at Venice, Cal., while Oklahoma will be on the circuit the first part of May. Elgin in the fall will be on deck as usual.

■ ■ ■

THE promoters apparently are doing their part to make racing a success and now it remains only for the motor car manufacturers to hold up their end and help make motor car racing the sport of millions. That the makers are not unwilling to do this is shown by the gossip that is going around of new teams being organized and cars being built. As there always is fire where there is smoke, there must be something to these rumors, so it would not be at all surprising if the roll call at Indianapolis shows several recruits from the ranks of the motor car makers. Indeed, one can safely predict that there will be six or seven more factory teams this year than last.

■ ■ ■

THE THEREFORE promoters will not lack for talent both in the way of cars and drivers. The European war undoubtedly has upset some of the plans but there will be several of the foreign drivers on the American circuit to add the necessary international flavor. So with these matters taken care of, the promoters can turn their attention to the financing of their projects. In doing so they should act with caution. Plans made while enthusiasm runs high may not work out so satisfactorily when put to the acid test and the big meets should be organized and promoted with just as much sagacity as if these same men would display in other businesses.

Uncle Sam Frames New Code for the Yosemite Valley

Rules to Govern Motoring in National Park Announced

MERCED, Cal., Feb. 2—Word has been received from the secretary of the interior stating that during the coming season eleven rules will govern the use of the roads in the Yosemite valley by motorists, instead of the sixty-five rules enforced last year. This announcement is a source of gratification to every California motor car owner and to the many easterners who contemplate motoring through the scenic valley next spring and summer. The rules in brief are:

1—Motorcycles are not permitted to enter the national park.

2—All motorists must secure permit from acting superintendent.

3—Tickets for passage must be secured from the first ranger station on the road over which the motorist enters the park. The ticket should be conveniently kept so that it may be shown to any park official upon demand and must be surrendered with the permit at the last ranger station upon leaving the park.

4—The fee for entering the park will be \$5, and application for permit which this fee grants must give name of owner of car, license number of car and number of passengers and name of driver. An additional fee of \$1 will be charged for entering the Mariposa Big Tree grove. Payment must be made in money or money order, checks being refused.

5—Motoring on the floor of the valley prohibited except for ingress and egress. Muffler cut-outs must be kept closed while on the floor of the valley.

6—Motor cars while in motion must be not less than 100 yards apart. All cars except while shifting gears must retain their gears constantly in mesh. Every person presenting a motor car for admission must satisfy the guard who issues the ticket of passage that his brakes are in first-class working order and for this purpose all cars will be required to effectually block and skid the rear wheels with either foot or hand brake.

7—Speed must be limited to 6 miles in descending steep grades. In ascending the speed must not exceed 9 miles an hour. On good roads with straight stretches the speed may be increased to 12 miles, but in no case must it exceed 15 miles.

8—When teams, saddle horses or pack mules approach, motor cars must take position on outside edge of roadway, regardless of what direction they may be going, taking care that sufficient room is left on the inside for the passage of vehicles and pack animals. Teams have the right-of-way. Motor cars must stop when teams approach and remain at rest until the teams have passed. All assistance possible must be given passing teams.

9—Motor cars leaving the park may go by any one of the authorized roads. Watches should be compared with clocks at the checking stations.

10—Fines or other punishment will be imposed for the arrival of motor cars at any point before the approved lapse of time at the following rates: Fifty cents per minute for each of the first 5 minutes; \$1 per minute for each of the next 20 minutes and \$25 fine or ejection from the park, or both, in the discretion of the supervisor of the park, for being more than 25 minutes early.

11—Violation of any of the rules will be considered cause for revocation of the permit and be cause for refusal to issue a new permit to the owner without prior sanction in writing from the secretary of the interior.

JOKE ON CALIFORNIA JUSTICE

SACRAMENTO, Cal., Feb. 4—Trapping motorists and making them pay fines for alleged violations of the speed laws has ceased to be so interesting to country justices, who have just discovered that owners of cars have put something over in the shape of a bill which went into effect January 4, abolishing fees for judges. These court officials only can draw salaries and inasmuch as in sixteen counties in California no provision is made for paying justices of the peace it

will be seen how the speed trap industry has been hit a telling blow. These 200 justices in the sixteen townships now are serving for love and their only hope lies in a bill introduced which will pay them a salary. But even if this passes it will be at least 8 months before the law could

go into effect and during that time the justices will have to work without pay.

While no positive step has been taken, yet there is a possibility of the motorists organizing to defeat this bill, which would be a hard blow at the country justices out this way.

See America First — • • • See America Now



EDITOR'S NOTE—This is the thirteenth of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be run in Motor Age with the idea of calling the attention of motorists to the picturesque points of interest in their own country.

No. 13—MOUNT TACOMA AND THE SLUISKIN FALLS

The latest view of Mount Tacoma, 14,456 feet in height, showing the Sluiskin Falls in the foreground and as seen from the newly completed 9 miles of government road on the mountain. This will be the objective point of thousands of motorists during 1915, as a side trip after traversing the Pacific highway along the Pacific coast; just an easy day's run from Tacoma, Wash.

O'Donnell in Duesenberg Winner of Glendale Race

Elks Promote Road Event and Have Ten Starters

GLENDALE, Cal., Feb. 3—Eddie O'Donnell in a Duesenberg, won the Glendale road race, staged here today under the auspices of the Glendale Lodge No. 1289 B. P. O. E. O'Donnell's time for the 103-mile course was 2:07:07 which is a slow average but when the nature of the course is taken into consideration, the speed of the winning Duesenberg is not to be discredited. Jack Callaghan, also in a Duesenberg, won second place. His time was 2:10:25. George Hill, Barney Oldfield's mechanic, driving a Chevrolet, captured third place, covering the 103 miles in 2:11:19.

There were twelve entries. At the wire, Tom Alley in Duesenberg No. 2, broke an axle and failed to get away. Huntley Gordon in the Gordon Special burned his brakes out in the first few miles of the race and after seventeen laps of nerve-wracking driving, he retired. Harry Reynolds, driving an Isotta-Fraschini, skidded on a turn and running into the curb, bent a front axle and retired in the twelfth lap. A. A. Cadwell went out with a broken water system in the forty-eighth lap. The starters were:

No.	Car	Driver
1.	Marmon	Ball
2.	Duesenberg	Alley
4.	Renault	Morris
5.	Gordon Special	Gordon
6.	Isotta Fraschini	Reynolds
9.	Alco	Taylor
10.	Duesenberg	Callaghan
11.	Marmon	Cadwell
12.	Ford	Elliott
19.	Duesenberg	O'Donnell
20.	Chevrolet	Hill

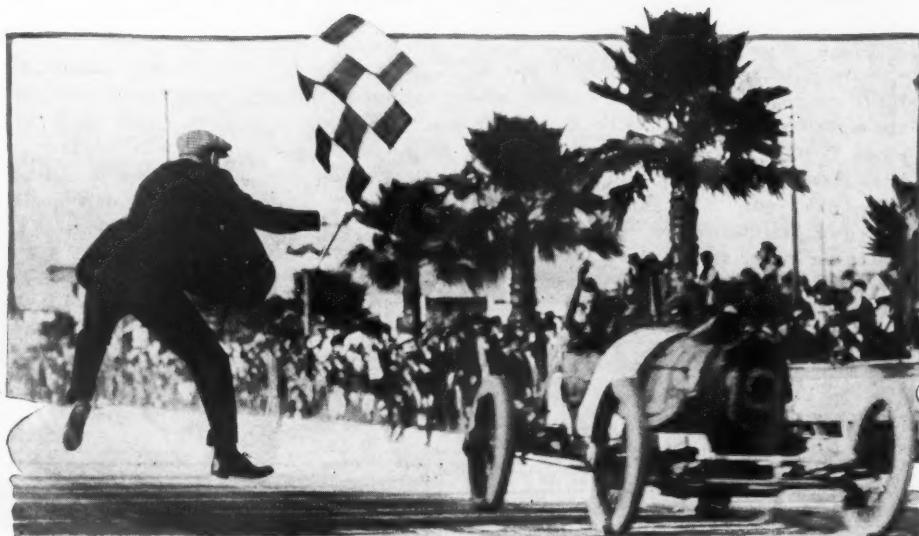
The Duesenbergs jumped into the lead on the first lap and held first and second places throughout the race. Gaston Morris in a Renault held third place for twenty-seven laps, then dropped to the rear when he over-ran a turn and blew a tire, losing 9 minutes.

Cadwell held third place for ten laps, going back when trouble first developed in the water system. Hill went into third place on the fortieth lap and held that position to the finish. He drove a conservative race and never stopped during the contest.

Guy Ball in a Marmon won fourth money and William Taylor in the veteran Alco which has figured in practically every California race during the past 2 years, won fifth money. Taylor's Alco has finished in the money in every race it has started in with the exception of the last Los Angeles to Phoenix road race. In the desert classic, the Alco was wrecked when it skidded into a telephone pole near the start. The old car came back and won a place in the San Diego race, having been in the repair shop at the time of the Corona classic.

The length of the Glendale course is 1.9 miles giving fifty-three laps to the race of 103 miles.

There were more than 10,000 spectators.



O'DONNELL IN DUESENBERG WINNING GLENDALE ROAD RACE. BARNEY OLDFIELD IN A NEW ROLE, THAT OF STARTER

Half the gate receipts went to the lodge for expenses and entertainment funds while the rest of the gate receipts went to the purse which was cut into five monies.

Barney Oldfield officiated as starter and George Adair, another Elk and well known Western Automobile Association official, was the assistant starter for the day.

The race was to have been held January 30, but a heavy storm such as delayed the Vanderbilt and grand prix last year at Santa Monica, caused the event to be postponed and the Elks, not wanting to interfere with the plans of the drivers entered for the races in San Francisco this month, held the event in the middle of the week and while they did not draw the crowd that would have undoubtedly attended had the race taken place on a Saturday or holiday, the affair was a great success.

RACE DRIVER CALLAGHAN KILLED

Los Angeles, Cal., Feb. 8—Special telegram—John D. Callaghan, of Kalamazoo, Mich., driver on the Duesenberg team, died here today as the result of an accident in a 100-mile race at Ascot Park track yesterday afternoon. Trying to pass D'Alene in a Marmon on the backstretch in a cloud of dust, Callaghan went through the fence. He was horribly mangled by a fence rail. Despite this he lived 24 hours. Callaghan had been racing for some time and at Elgin last fall he drove a Keeton. Since coming to the coast he had been doing well in the Duesenberg, being runner-up to O'Donnell in the recent Glendale road race.

The 100-mile race yesterday was won by O'Donnell in a Duesenberg in 1:41:31. Alley in another Duesenberg was second; Taylor in the Alco third; Cadwell, Marmon, fourth. D'Alene went out in the

seventieth lap because of a burnt bearing; Babcock in the Isotta stopped on the sixtieth lap; Elliott in a Ford went ten rounds. The Callaghan accident occurred in the fifteenth lap.

FRISCO'S BIG ENTRY LIST

San Francisco, Cal., Feb. 4—To date there are twenty-four entries in for the Vanderbilt and grand prix, that is official declarations; but there are enough more in sight or in the mails to make it almost an absolute certainty that there will be at least thirty cars named for the two road racing classics that will be run over the exposition course the latter part of the month.

In addition to the twenty-four actually booked, it is known positively that Ralph de Palma is in with E. C. Patterson's Mercedes six, the same one that was to have started in the last 500-mile race at Indianapolis. Then, too, Huntley Gordon, the Los Angeles sportsman, has mailed the entry of his Gordon Special, in which he has done so well in recent road races. Arthur Klein also says he has named a King, while it is almost certain that a fourth Maxwell will go in the grand prix, with Grant driving.

Word also comes from the east that Case is shipping two cars out for the classics in charge of Eddie Hearne who will drive one of them. It is said the other will be turned over to Bob Burman, who has decided not to race his Peugeot again until Indianapolis because of the trouble he has had with his cylinders.

At present the official entry list of twenty-four cars is as follows, each car being in both races:

Car	Driver
Stutz	Gil Anderson
Stutz	Earl Cooper
Stutz	Howard Wilcox
Peugeot	D. Resta

Peugeot	Unannounced
Mercer	Glover Buckstall
Mercer	Eddie Pullen
Mercer	Louis Nikrent
Marmon	A. A. Cadwell
Marmor	Wilbur D'Alene
Simplex	Louis Disbrow
Chevrolet	Jack Le Cain
Maxwell	Barney Oldfield
Maxwell	W. Carlson, Jr.
Maxwell	E. V. Rickenbacher
Duesenberg	Tom Alley
Duesenberg	Eddie O'Donnell
Delage	C. R. Newhouse
Tahis	Jack Gable
Edwards Special	Unannounced
Edwards Special	Unannounced
Californian	Caleb Bragg
Bugatti	J. B. Marquis
Parsons Special	Jim Parsons

COINS NEW MOTOR PHRASE

Milwaukee, Wis., Feb. 8—A Milwaukee judge has coined a new phrase, "Cruelty to motor cars," but holds that there is no law to cover the offense, as there is for the charge of cruelty to animals.

Ralph Ziegler, owner of a roadster, drove down Grand avenue one evening last week with eighteen young men, students at Marquette university, perched on the car. On passing the principal corner, at Third street, the roadster gave up the ghost and settled calmly into the snow-banks. The traffic officer ordered the nineteen passengers to leave the car, which they did. After an hour or more the crowd returned and when all attempted to remount, the officer called the patrol and sent them all to the lock-up, where they deposited bail to a man.

In police court the next morning the judge got explanations from both sides and then dismissed the case, remarking to the traffic officer, "I don't see how you can charge a man with being cruel to a motor car. If Ziegler wants to stand for

eighteen men being on his roadster, that is his business, and I don't see how you can stop it."

CHICAGO OFFERS \$54,000 PURSE

Chicago, Feb. 8—Equaling Indianapolis so far as the purse proper is concerned, but going the Hoosiers one better in the matter of prize money for leaders at each of the first four 100-mile posts, the management of the local speedway announces \$50,000 for the first ten places in the 500-mile race which is to be run June 19. In addition \$1,000 will be given to the leaders at 100, 200, 300 and 400 miles, making the total of the purse \$54,000. First prize is \$20,000. Instead of money Indianapolis offers trophies to the leaders at the intermediate points.

Charles Y. Knight's First Attempt at Building a Racing Motor, the Minerva

WITH the appearance of the Porter-Knights at the speed and road events during the coming racing season, Americans will have their first opportunity to see the performance of specially designed Knight racing motors. America witnessed the performance of a Knight engine at the Indianapolis event of 1912 in the Mercedes-Knight driven by Pilette. But this was a stock touring motor.

It was in the Tourist trophy race in the Isle of Man last June that special Knight racing motors made their first entrance to the racing field and, seeing that the Minerva company had practically no experience of racing, the success of the car was really remarkable. It was understood at the time that some of the special features of the design had proved good and some less satisfactory, so it will be interesting to compare the Knight motor to be

used for American racing with the Minerva in order to see what details have been perpetuated.

Minerva engine's dimensions were 3.54 inch bore and 5.1 inch stroke, the most striking difference in construction being that the sleeves were operated by two shafts instead of one—like a T head poppet valve motor. The sleeves were lifted from one side only and the use of two shafts was to permit double sized bearings for the little sleeve connecting rods. At the foot of each cylinder there was a supplementary exhaust port opened and closed by the sleeves and this was responsible for a great loss of oil and heavy smoking. Charles Y. Knight was reported as having declared his intention of trying, in any future racing motors, the experiment of using the bottom ports as intakes instead of exhaust outlets, but be this as it may,

the additional port area has a great effect on the power.

There was a double lubricating system, an ordinary gear pump supplying the drilled crankshaft, while a special plunger pump supplied the sleeves. This pump sent oil under pressure to a cavity in the cylinder wall and also sucked it back from the same place, the idea being to insure a supply to the sleeves and to prevent the accumulation of such pressure that oil could be pumped actually into the combustion space. The outer sleeve was drilled with many large holes, partly to decrease its weight and partly to allow oil to pass to the inner working surface.

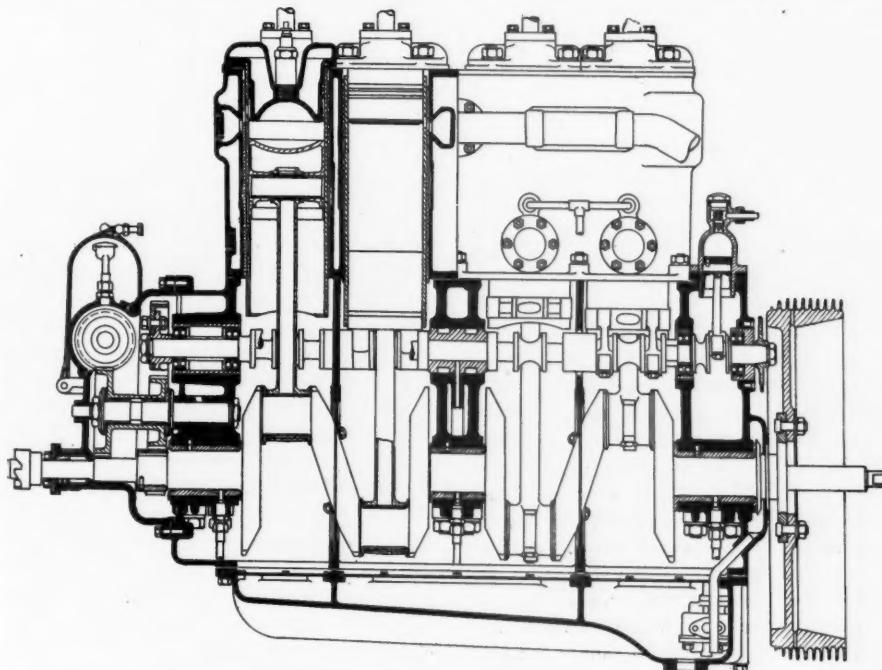
The problem with the Knight motor for racing is to get sufficient port opening in conjunction with sufficient overlap of the sleeves effectually to close the ports during the working stroke, but the sleeves allow supplementary ports to be used without their drawbacks as found on an ordinary motor, because they can be opened and closed as desired instead of being open continuously. Thus it is almost certain that some sort of additional porting will be employed on the new designs even though it may be quite different from that of the Minerva motor.

TWO MORE INDIANAPOLIS ENTRIES

Indianapolis, Ind., Feb. 9—Two more entries for the 500-mile race have been received, bringing the total to ten. The latest nominations are those of two Duesenbergs, which are just 1 inch inside the 300-inch limit and which will be driven by Tom Alley and Eddie O'Donnell. It is expected that a third Duesenberg will be declared early in May.

NO SCORCHING IN MILWAUKEE

Milwaukee, Wis., Feb. 6—For the first time in the history of the Milwaukee police department, not one arrest for speeding was recorded during the month of January, 1915. In past winters there were usually six or seven arrests per month.



CONSTRUCTION OF SPECIAL MINERVA MOTOR, THE FIRST RACING KNIGHT ENGINE, USED IN THE ISLE OF MAN RACE

Decision Is Rendered in the Stromberg-Zenith Suit

Ruling Made in Carbureter Patent Litigation in Chicago Court

CHICAGO, Feb. 3—Judge Sanborn, in the United States district court for the northern district of Illinois, decided today the suit of the Stromberg Motor Devices Co., Chicago, against the Zenith Carbureter Co., Detroit, Mich., in favor of the Zenith company, in regard to one model now being manufactured, and against the Detroit concern with reference to two discontinued models. The Ahara, Richard, Sturtevant and Anderson patents are the ones upon which the complainant based the present suit. The testimony in the case was taken in September, 1914.

The case just decided in the lower court involved four carbureter patents as named above, two of which, the Ahara and Richard, were claimed to be infringed by previous Zenith types in the suit of the Stromberg company against the John A. Bender Co., Chicago, agent for Keeton cars, which were equipped with Zenith devices.

The Bender case was decided in February, 1914, in favor of the Stromberg company. It will be remembered the Stromberg attorney attempted to convince the court that the Zenith company was a party in the suit for the reason it supplied fees and lawyers to conduct the defense. Bender declined to appeal, dropped the Zenith lawyers, engaged his own and dismissed the appeal and consented to final decree. This brought the Stromberg company face to face with the question of bringing suit against the Zenith company, the latter having issued a legal battle in May, 1914. The decision today was the result. But since the time of the Bender case the Zenith company has discontinued two types of carbureters which are said to infringe and is manufacturing and selling one type which is declared by Judge Sanborn to be free of infringement.

"If the Zenith does not infringe any of the complainant's patents in its main operation, as I think it does not, it should not be held to infringe in a minor operation not clearly disclosed by any of such patents," says the judge. "Infringement is, at least, doubtful and should not be decreed."

Judge Sanborn continues further: "As no infringement appears by the No. 2 carbureter no injunction should issue, but there should be a decree to the effect that the Ahara and Richard patents were infringed by the manufacture and sale of carbureters like Nos. 1 and 10 and for an accounting and damage without costs to either party."

The No. 2 carbureter is the one now being made and sold by Zenith; Nos. 1 and 10 are the discontinued types.

So it sums itself up into this: That the Stromberg company can collect royalty on

the carbureters called No. 1 and No. 10, which have been discontinued by the Zenith company, but which were being made when the Bender suit was on. The three carbureters in question have manufacturing dates as follows: No. 1, made between August, 1911, and August, 1912; No. 10, made in March, 1912, and shortly afterwards discontinued, and No. 2, made between March, 1913, and April, 1914, and being made at the present time.

In the present case Judge Sanborn in his decision likens the suit to the previous one against Bender, saying: "In the Bender suit the decision turned on the distinction between suction-controlled and gravity-controlled nozzles and infringement was found because it was thought the Zenith device there shown, like Ahara, was not gravity controlled in the secondary nozzle" * * * "So the matter practically comes down to the question whether carbureters with two $\frac{3}{8}$ -inch vents said to create no vacuum at all in the U-tube, should be held to infringe."

Judge Sanborn evidently came to the conclusion cited above, because as he says, "The Bender decision went upon the theory that a $\frac{1}{8}$ -inch hole in the Zenith well would so restrict the U-tube as to create a vacuum therein and so operate just like the Ahara. The vents having now been enlarged so there is no sub-atmosphere (vacuum) in the well, the Ahara patent is not infringed."

The Richard patent being an improvement of the Ahara, the judge similarly decreed that it was not infringed by the Zenith carbureter now being made by the manufacturing company.

In commenting on the validity of the Sturtevant patent, Judge Sanborn said: "Sturtevant is clearly valid, but I do not think it infringed."

Relative to the Anderson patent, the judge continued: "With all these differences (four were named in the decision) in means of operation and result, particularly in operation and construction, infringement is so doubtful that it should not be decreed."

The patents involved in this case are numbered as follows: Ahara, 684,662; Richard, 791,501; Sturtevant re-issue, 12,611, and Anderson, 1,063,148.

The Ahara and Richard are somewhat the same, the latter being an improvement of the Ahara. This is known as the atmospheric well type, that is, a type of carbureter in which the proper mixture is maintained at the various engine speeds by means of an auxiliary supply of fuel from a well which communicates with the atmosphere and which is fed from the constant level fuel chamber or float chamber.

The Sturtevant patent relates to a com-

bination of two distinct mixers, the main one for ordinary use and the other for low-speed and being in operation also when the other is working. The Anderson patent relates to the Stromberg model E, which has not been pushed extensively.

As the case stands the Stromberg company may collect on the two discontinued but infringing carbureters and appeal on errors in the case just decided. In all probability an appeal will be made by the Stromberg and Zenith companies.

TELLS OF ZENITH IN THE WAR

Detroit, Mich., Feb. 8—In a recent communication from Paris, F. Baverey, prominent in the affairs of the four allied factories of the Zenith Carbureter Co., writes that in France and in England both Zenith factories are greatly handicapped through the loss of enlistment of their more experienced workmen but the production goes steadily forward and war orders for England and France have precedence. This leaves the Detroit factory the only one working under normal conditions. Baverey is a captain of the siege artillery of the French forces, an arm of the service which has not been called upon up to the present time.

"The motor truck and the motor car are going through the acid test as never before," writes Baverey. "Efficiency of gasoline, tires or motor are forgotten items so long as the vehicle delivers its load of ammunition, food, or troops at its destination on time. The carbureter is called upon to handle every available grade of fuel in all kinds of weather and haste in filling tanks means dirt and possible trouble at critical moments. Our carbureter with its non-adjustable features and ability to use different fuels is showing up well."

HANCH ERSKINE'S ASSISTANT

South Bend, Ind., Feb. 6—C. C. Hanch, of the Marmon company, who joins the forces of the Studebaker Corp. on March 1, has been made assistant to A. R. Erskine, first vice-president and treasurer of the Studebaker Corp. This executive position will include participation in the official counsels of the company and membership on the finance committee.

H. O. SMITH VOLUNTARY BANKRUPT

Indianapolis, Ind., Feb. 6—Harold O. Smith, president of the Premier Motor Mfg. Co., now in the hands of a receiver, today filed a voluntary petition in bankruptcy in the United States court in this city. He states that his liabilities are \$142,319.54 and his assets \$122,584.06, and he claims the statutory exemption of \$600. Of his liabilities, \$80,982.17 represents

creditors holding Premier first and second series of preferred and common stock, owned by him, as security. His assets include the following Premier stock, the amount being the par value: 301.5 shares common, \$30,150; 127 shares first series preferred stock, \$12,700, and 785.8 shares second series preferred stock, \$78,580.

FLECHTER SUIT MUST PROCEED

New York, Feb. 8—Special telegram—Judge Lacombe has denied the motion of the Trenton Brass and Machine Co. to set aside the service of summons in the suit brought against it by Leonard V. Flechter, who alleges breach of contract and asks for damages of \$60,000 and claims there is also due him \$200 for unpaid salary. The trial of the suit must now proceed. Flechter is the inventor of the Flechter carburetor. The case is in the United States district court for the southern district of New York.

WILSON JOINS L. P. C. FORCES

Racine, Wis., Feb. 8—George B. Wilson, who retired as president of the Racine Rubber Co., Racine, Wis., at the last annual meeting, has become associated with

the L. P. C. Motor Co., of Racine, as treasurer. Mr. Wilson is succeeded by H. L. MacClaren, who also is president of Mitchell-Lewis Motor Co. Mr. MacClaren was head of the rubber company before succeeding Captain William Mitchell Lewis as executive of the Mitchell company. In the L. P. C. company, J. M. Cram, secretary, is advanced to vice-president, a position until now filled by Captain Rene M. Petard, chief engineer, who is in France on war duty.

SAMSON MAY MOVE EAST

Louisville, Ky., Feb. 8—Additional capital of \$50,000 for the Samson Engineering Co., which manufactures a single-unit starting, lighting and ignition system for motor cars, has been pledged by an eastern man, provided another \$50,000 is otherwise subscribed to enable the company to so extend its facilities and be able to handle large orders. An offer from eastern interests to move the plant now located in the Snead manufacturing building to Plainfield, N. J., is under consideration, and the Louisville Commercial Club is trying to interest local capital in order to retain the industry. The company plans to widen the scope of its busi-

ness, employ more men and purchase additional machinery. The system is the invention of J. K. Delano, Jr. The company was organized a few months ago with a capital stock of \$350,000. B. N. McGraw, D. A. Caldwell and N. H. Wright are the incorporators.

TIRE FACTORY FOR CHICAGO

Chicago, Feb. 8—The Maibohm Rubber Co. has been organized in Chicago for the purpose of manufacturing tires. Harry C. Maibohm, founder of the Motor Supplies Co., is president of the new concern, which has temporary quarters at 28 East Jackson boulevard.

BOSTON SHOW SPACE AWARDED

Boston, Mass., Feb. 6—Space in the Boston show has been practically all awarded. As a result there has been sixty-five spaces allotted to passenger cars and twenty-nine to truck dealers. In the exhibition there will be cars and trucks never exhibited in Boston before. More than twenty different tires will be displayed, and the accessory section will be larger than ever. Between 300 and 400 vehicles will be shown.

Million-Dollar Bid for Lozier Company Assets Accepted

Winternitz Buys Krit Company's Property

DETROIT, Mich., Feb. 6—An even million dollars was bid and accepted yesterday for the total assets of the bankrupt Lozier Motor Co. The purchasers are the Frank Bros. Iron and Metal Co.; the Harris Bros. Co., both of Detroit; Theodore Friedberg and Charles Shongood, both of New York. The first three parties are in the metal and machinery business and Shongood is a United States auctioneer in New York.

Speaking about the future plans of the purchasers, Samuel Frank stated that the Lozier Motor Co. will be operated as a going concern within the next 10 days, a new company will be organized with a sufficient capital which will permit the immediate reopening of the plant. There is a possibility that the Plattsburg property will remain closed for the time being or disposed of to other parties.

The total assets of the Lozier company had been appraised by that concern at \$4,899,972.65 but the appraisers of the Detroit Trust Co., trustee, figured the liquidation value of the quick assets at \$1,366,584.46 and the land and buildings at \$866,873.23, as a going concern, or the total assets at \$2,233,457.69.

It is estimated that after all the expenses are paid such as court fees, attorney's bills, etc., there will be sufficient funds to eventually pay about 30 per cent of their claims to the creditors.

At Thursday's sale in the bankruptcy's

court, only a total of \$840,000 was bid—\$640,000 for the property in Detroit and \$200,000 for that of Plattsburg, N. Y. When the matter came up for confirmation by Referee in Bankruptcy Lee E. Joslyn, Attorney Leo M. Butzel, representing a creditors' committee objected to the bids and stated that \$1,000,000 would be the minimum acceptable to his clients. Then followed a conference between the bidders, the attorneys, the Detroit Trust Co.'s officials and finally it was decided that a satisfactory arrangement could be reached provided the sale of the Plattsburg plant was included with the Detroit plant. To this Mr. Shongood, who had purchased the New York property, assented. The result was that a new bid of \$1,000,000 was made for all the Lozier Motor Co.'s assets and it was accepted and confirmed.

According to the sales agreement \$200,000 is to be paid in cash, half within 90 days and the other \$100,000 within 6 months; the balance of \$800,000 to be settled within 1 year, with the privilege for the purchasers to return the real estate in Detroit within the next 8 months, on a basis of \$300,000.

WINTERNITZ BUYS KRIT ASSETS

Detroit, Mich., Feb. 6—The combined assets of the Krit Motor Car Co., and the Krit Sales Co., which had been appraised by these companies at a total of \$879,347.97 and by the official appraiser, at

\$210,436 were purchased yesterday for \$120,000 by Samuel Winternitz & Co., Chicago, the sale being confirmed by the referee in bankruptcy.

The Chicago concern made a deposit of \$12,000 and also gave a bond of \$25,000 to guarantee that it will keep its engagement, the bond being given to Frank W. Blair, of the Union Trust Co., trustee for the Krit Motor Car Co., and to Henry Lansdale, trustee for the Krit Sales Co. It also was agreed that if the total amount of \$120,000 is paid within 90 days a discount of 2½ per cent will be allowed or \$3,000.

For its purchasing price the Winternitz company obtained stock of material, finished and unfinished cars and chassis, having a total value of \$161,546.03; factory equipment, tools, jigs, office furniture, etc., valued at \$21,453.71; patterns, dies, drawings, valued at \$2,500; ten cars and trucks used by the Krit plant and valued at \$3,375; equity in buildings, land and in land contract covering the premises on which the Krit Motor Car Co. is located, valued at \$15,000; stocks of parts, tools, supplies, office furniture and fixtures, located in the Philadelphia branch, valued at \$6,561.28.

In commenting upon the purchase, the Winternitz company said that it is its intention to reorganize the Krit company. An announcement will be made as soon as the plans have been perfected.

Farmers Are Converting Wheat Into Motor Cars

Minneapolis Show Demonstrates Possibilities of the Northwest

MINNEAPOLIS, Minn., Feb. 6—Not until one gets out here during show week and talks to the exhibitors and the visitors does one realize the meaning of "gateway of the northwest," the subtitle given the Twin cities. The eighth annual show, which closed here this evening, gave the proper emphasis to this as it is applied to the motor industry, for no more remarkable motor car exhibition ever has been held in this country.

Chicago thought it was the magnet which drew the dealers, but the Twin city record of 4,000 agents here during the week of the display makes Chicago look to its laurels. And those 4,000 dealers came here with many prospects and in consequence of this the success of the show cannot be denied. The attendance was 25 per cent greater than at any previous northwest show, the paid attendance alone amounting to 40,000, while there must have been thousands and thousands who were furnished tickets by the dealers.

As a motor show the Twin city display is of no mean proportions. The National Guard armory and annex affords 50,000 square feet of floor space. The armory has a square floor space, with a narrow gallery for accessories on three sides; and the annex, of slightly larger area, lies on one side and is reached by a 50-foot passageway. In these buildings, were cars, trucks, tractors, electrics and accessories.

All told fifty-eight different makes of gasoline passenger cars were exhibited; five makes of electrics, seven of gasoline trucks, three of gasoline farm tractors and fifty-two accessories. The totals of vehicles exhibited were: Gasoline passenger cars, 163; electrics, 13; gasoline commercial trucks, 13; gasoline farm tractors, 4; total, 193.

Compares With New York

The display of cars compared favorably with that in New York and Chicago, many of the displays from those shows being sent here. The chassis display was heavy, there being twenty-eight. The display of electrics was particularly good—Minneapolis is a good electric center—there being five makes represented, Detroit, Rauch & Lang, Ohio, Milburn and Chicago. All vehicles shown were closed types excepting the Detroit cabriolet or roadster type, a vehicle well suited for all-year-round use.

Minneapolis is not classed as a retail show but a great distributing exhibition for the northwest section of the country, so that the farmer plays a most important part during show week. He was here in overwhelming numbers and he came to buy. With him came the dealers, ready to place specifications for shipment of cars to the territory handled by them.

By David Beecroft

When you think of cars out here you think of farmers. They are the great, big, overwhelming, dominating factor in the northwest. They own the territory, and Minneapolis and St. Paul are mere necessary excrescences. Going through the show and talking to exhibitors you become almost calloused to such expressions as "I sell 75 per cent of my cars to farmers," or "Ninety per cent of our sales are to farmers." This is the farmers' country. There are 384,000 of them in the state of Minnesota and of these not 10 per cent own cars. One-half of the annual output of the country could be sold in this state alone for a year or so. To this you must add the two Dakotas and the east half of Montana.

Analyzing the Farmer

Let us briefly analyze the farmer, what he has, what he wants and what he is going to be? First, he has more money today than he ever has had before. Wheat is the answer. Minnesota and the two Dakotas have this year produced 280,000,000 bushels of this precious cereal, and the farmer has sold it at an average of 50 cents a bushel ahead of any previous year. This means \$140,000,000 additional going to the farmers in these three states. The state of Minnesota alone has a wheat crop of 90,000,000 bushels, meaning \$45,000,000 additional, more than the farmer looked for.

With this additional wheat money of \$140,000,000 the implement man and the motor car dealer are going to benefit most. They come first. With wheat selling here today at \$1.54 per bushel the farmer is getting \$1.37 per bushel at the grain elevator. On August 1 he was getting 95 cents per bushel and the price has been rising steadily ever since.

No wonder 90 per cent of the cars are owned by farmers. During 1914 the number of cars in Minnesota increased 50 per cent. On November 1, 1914, there were 64,185 cars registered in the state. A year previous there were 42,664 registered. The Farmer, an agricultural paper published in St. Paul in a recent analysis of the motor cars sold in Minnesota last year, says that 63 per cent of the 21,521 cars sold went to people whose postoffices are in towns of fewer than 3,000 population. This is another way of saying that these cars were sold to farmers. In North and South Dakota the same is true, only more so. The farmer is the big buyer. He is the brawn and sinew of the industry in this great distributing zone.

Farmers in this zone are divided into two classes, the grain farmer and the dairy or mixed farmer. The first grows only

grains, wheat, oats, etc. He is found in western Minnesota and in the Dakotas. The dairy farmer grows grain, but has many cattle, sheep and swine, and depends on a variety of sources of income. He gets money in each month from the sale of cream, he sells stock and he sells grain. He is found in Wisconsin and generally in eastern Minnesota. He is invading a few of the eastern counties in the Dakotas. His money comes in off and on during the entire year.

Contrast this farmer with the one who grows grain only, who sells his grain in the fall and gets his money in once a year, and whom, if his grain fails, has no other source of income. Place yourself as a dealer selling to such, selling 90 per cent of your output to them. Begin with the basic assumption that you must do business on a credit basis. You must sell for a little cash and take notes at 3, 6, 9 and 12 months for the balance. That is how cars are sold to these farmers. The dealer gets as much cash as he can and takes notes for the balance.

In Minnesota the notes in the mixed or dairy farming territory are for short periods, 3 or 6 months, and carry interest at 6 or 8 per cent. In the grain farming sections the notes often run for 9 or 12 months and carry 10 per cent interest. The dealer takes these notes to his banker who gives the dealer their face value in cash. When the notes are due the banker notifies the dealer, who in turn notifies the farmer and makes collection, so that often the farmer does not know the bank has held the note. Farmers prefer to do this instead of going to the bank for a loan, as often the banks aim to discourage the farmer from buying a car. These farmers have been buying on credit since they settled in the territory and you cannot do business with them at present on any other basis.

Want Touring Cars

These farmers want touring cars, not roadsters. They all have families, hence, a rational five-passenger car. And they want power. Many roads are heavy and hills steep. As a result horsepower is a greater selling factor in this territory than in New England, or the east with its improved roads. This explains why several makers of small cars, building only runabouts a year ago, have brought out touring cars, this referring to such as Saxon, Grant, Metz, et al. In the Dakotas the farmer is buying a two-wheel trailer, carrying a box 3 by 8 feet. He attaches this to a cross bar fitted above the rear spring and on this trailer he can carry a load of 1,500 pounds at a speed of 22 miles per hour. In general the farmer wants a tonneau type as he can carry his produce to

market, bring home his flour, groceries and binder twine; in short, his motor car has entirely replaced his horse vehicle on the road except for taking grain to the elevator.

These farmers do not take the best care of their cars. Some are not washed from January to December and in the alkaline sections in South Dakota and Montana the body finish is soon ruined, black suffering quickest.

Farmers who buy cars on credit expect to secure accessories, tires, gasoline, and oil and also get repairs on credit. This is another big dealer's problem. In the dairy country with cream checks coming in once a month, the dealer gets his money with reasonable regularity, but in some of the grain sections in Dakotas, Montana or western Minnesota, there is pay only once a year and that if crops are good. Often the dealer carries the account for 6 months and then takes a note for 6 or 9 months with 10 per cent interest. But heroic efforts are being made to get repairs and accessories on a cash basis. In Montana, F. E. Doran, in Lewistown, a town of 6,000 population, started on a cash basis last August and now all the dealers in the town have followed suit. Doran has issued coupon books with \$25 worth of coupons which he sells for \$22.50 or 10 per cent discount. These are sold for cash. The coupons are good as payment for everything except tires and paying for a new car. In the first month he sold seventy books, and now the farmer is well pleased. Before making the change Mr. Doran had posters placarded all through his territory and he advertised the fact.

Adopt New Cash Scheme

Dealers in South Dakota and other parts of Montana are now adopting this new cash scheme. The dealer in the west calculates that it costs 10 per cent to make collections, and the discount of 10 per cent allowed on the coupons is very attractive to the farmer. The coupon books are the same size as a conventional blank check book. The coupons are in \$1, 50, 25, 10 and 5-cent denominations.

The selling season in the Minneapolis zone is largely confined to April 1 to October 1. This is most true with small cars, which may be sold prior to April 1 but with that date or April 15 specified for deliveries. Cars listed at \$1,000 and thereabouts sold better this year in December and January than ever before. The best selling season for high-priced cars ends December 1, as after that date a large percentage of their owners go to California or Florida.

Gradually is the motor car being used more all winter here. F. W. Abby, of the Overland agency here, says that this winter 75 per cent of their cars are being kept out all winter, and this is a fair criterion of other makes. F. E. Murphy, Mitchell and Paige distributor, while making few closed-car sales claims that nearly all of these cars in the Twin cities are run-

There are 463 different makes of cars represented among the 64,185 owned in Minnesota. Herewith is a table, compiled by the Farmer, an agricultural paper published in St. Paul, which shows the distribution of ownership and proves that the farmers are the big consumers in the Gopher state, as 25,959 of the 64,185 cars are owned in towns with populations of under 1,000.

Name of Car	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	to	Over
	Under 1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	20,000	Total
Abbott	29	15	3	1	1	2	6	1	3	3	93	158
Auburn	18	9	4	5	.....	1	1	.....	2	4	73	117
Brush	276	52	27	4	2	7	9	15	3	3	17	508
Bulck	2,511	974	395	223	88	137	173	79	35	82	172	912
Cadillac	254	143	64	23	11	31	73	52	19	20	104	783
Carter Car.	82	22	11	4	1	1	4	4	4	2	3	161
Case	150	46	14	13	6	4	12	16	4	5	26	296
Chalmers	114	75	28	11	16	10	26	18	3	4	31	783
Chase	11	4	2	1	.....	.....	.....	.....	2	5	116	141
†Chevrolet	235	76	28	8	6	9	14	17	1	3	10	464
Cole	19	12	14	8	.....	.....	7	.....	1	13	125	199
Columbus	8	.....	5	.....	.....	.....	2	.....	1	9	258	283
*Detroit	58	16	11	1	.....	6	8	5	3	3	6	165
†Detroiter	57	15	4	3	.....	1	2	3	1	4	109	163
Elmore	26	5	6	6	.....	1	2	3	1	2	13	237
/E. M. F.	577	254	120	47	20	27	42	33	6	9	48	239
Empire	72	28	2	4	1	12	1	1	1	1	27	149
/Flanders	216	69	32	17	3	11	14	7	2	7	12	133
Ford	9,997	2,790	1,393	570	201	277	381	238	102	185	498	2,707
Franklin	51	19	11	4	4	4	2	7	2	2	9	236
*Halladay	93	26	7	5	1	2	3	1	2	2	95	237
Haynes	18	13	3	.....	3	.....	1	2	1	1	2	118
Hudson	139	86	31	9	7	8	7	22	24	20	50	319
Hupmobile	277	133	18	28	6	13	19	14	11	3	18	252
Imperial	179	79	38	4	2	11	13	1	2	10	31	370
International	269	56	24	6	6	5	9	14	6	2	21	438
Inter State	100	16	6	2	5	.....	3	5	3	1	15	93
Jackson	266	84	44	20	2	4	15	6	4	31	94	570
||Jeffery	61	30	8	5	1	1	6	7	2	4	41	166
Kissel Kar.	71	37	11	16	10	4	10	38	.....	23	338	560
Krit	226	76	33	13	2	7	4	4	1	5	13	483
Little	59	14	9	4	1	2	5	6	1	3	62	166
Luverne	26	8	47	.....	.....	.....	1	.....	.....	20	102	102
Mason	53	15	1	2	.....	8	1	.....	1	23	104	104
Maxwell	1,096	297	138	59	37	63	53	40	10	20	55	392
Maytag	64	21	3	4	1	.....	2	.....	.....	13	108	108
Metz	195	71	22	6	3	5	11	5	2	1	15	65
Metzger	41	16	8	1	4	6	4	6	1	10	20	116
Michigan	53	30	13	7	2	1	7	4	8	4	50	179
Mitchell-Lewis	368	120	70	32	30	12	32	37	5	15	31	246
Moline	32	11	6	3	1	.....	2	.....	1	1	47	104
Oakland	189	84	18	17	6	4	14	11	2	2	12	270
Oldsmobile	109	34	12	8	7	5	14	3	5	24	225	446
Overland	2,391	796	354	137	33	54	117	85	41	85	135	745
Packard	19	13	7	6	4	5	7	22	1	2	21	538
Paige-Detroit	174	57	20	8	4	2	10	8	2	1	23	94
Peerless	12	6	1	.....	4	1	1	1	1	9	249	284
Pierce-Arrow	22	7	9	5	1	2	1	2	1	5	201	256
§Rambler	204	97	26	16	11	6	7	18	9	8	13	177
Rauch & Lang.	1	6	.....	.....	.....	.....	.....	.....	7	104	118	118
R. C. H.	69	28	12	1	3	2	6	1	3	16	42	183
Regal	345	86	45	36	12	7	23	3	4	6	20	272
Reo	849	280	93	56	35	46	56	14	2	19	83	329
Saxon	59	25	28	.....	2	.....	3	.....	3	4	26	155
Stevens Duryea	22	1	3	1	3	4	1	2	3	7	8	135
Stoddard Dayton	41	13	14	12	2	10	14	4	3	1	27	116
Streator	78	13	2	8	1	2	2	.....	6	31	141	141
Studebaker	1,212	524	242	109	30	51	67	49	14	38	106	559
Thomas Flyer	24	10	4	2	1	.....	1	5	2	5	93	149
Veerac	11	5	9	8	4	1	4	1	1	3	9	47
Velle	171	62	21	17	4	5	11	12	28	3	22	234
White	30	12	6	2	4	3	3	6	2	1	2	211
Wilcox	15	5	10	6	2	2	2	2	1	4	4	276
Winton	43	27	5	.....	2	2	2	5	1	10	9	125
Woods	1	.....	.....	.....	.....	1	.....	.....	5	93	100	100

† See also Little.

‡ This name apparently incomplete.

§ Apparently same as Briggs-Detroiter.

/ Formerly made by the Studebaker Corporation.

♦ Same as Streator.

|| Formerly the Rambler.

|| Now called Chevrolet.

§ Now called Jeffery.

** Same as Halladay.

MINNESOTA'S CAR STRENGTH FOR YEAR ENDING NOV. 1, 1914

Size of Towns	Year ending Nov. 1, 1911	Year ending Nov. 1, 1912	Year ending Nov. 1, 1913	Year ending Nov. 1, 1914
Under 1,000 population	5,760	10,362	16,446	25,959
1,000 to 2,000	2,249	3,678	5,821	8,501
2,000 to 3,000	1,014	1,663	2,489	3,984
3,000 to 4,000	432	746	950	7,757
4,000 to 5,000	222	340	490	710
5,000 to 6,000	265	447	670	965
6,000 to 7,000	404	584	820	1,431
7,000 to 8,000	132	456	698	1,044
8,000 to 9,000	190	185	369	445
9,000 to 10,000	194	301	528	642
10,000 to 20,000	742	1,061	1,208	1,987
20,000 and over	6,138	8,865	12,158	16,760
Total registrations	17,652	28,688	42,664	64,185

COMPARATIVE TOTALS BY YEARS

	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	to	Over
Totals	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	20,000	Total
1914.....	25,959	8,501	3,984	1,757	710	965	1,431	1,044	445	642	1,987	16,760
1913.....	16,446	6,821	2,489	950	490	670	820	698	369	528	1,208	12,158
1912.....	10,362	3,678	1,663	746	340	447	584	456	185	301	1,061	8,865
1911.....	5,760	2,249	1,014	432	222	265	404	132	100	194	742	6,138
1909.....	1,169	705	280	87	84	136	153	62	90	67	252	3,197

ning all winter. With him April, May and June are the big selling months.

W. E. Wheeler, distributor for Chandler and Saxon, estimates that 90 per cent of his cars goes to the country and naturally sales must be crowded into a few months. December 1 to April is his time for deliveries. L. H. Fawkes, distributor of Reo, Stutz, Metz and Milburn electric, sells 95 per cent of his Metz cars to farmers, they taking seven touring cars to each roadster. Over 75 per cent of the Chevrolet cars go to farmers, a condition true with Hupmobile, Buick, Dort, Maxwell and many other makes.

Because of its high percentage of sales to farmers, the Minneapolis territory cannot be considered a high-priced one, rather a neat medium-priced field. This is well emphasized by an analysis of the car registrations in Minnesota which shows as follows:

Ford	19,399	Regal	859
Buick	5,781	Hupmobile	792
Overland	4,973	Chalmers	783
Studebaker	3,001	Hudson	722
Maxwell	2,260	Packard	645
Reo	1,861	Jefferies	592
Cadillac	1,577	Verie	590
E. M. F.	1,422	Jackson	570
Mitchell	998		

While these figures are for Minnesota only they give a sane estimate of the trend for the entire territory. It is conservatively estimated that 25,000 cars were distributed from this center last year and that nearly 50 per cent gain will be shown for 1915.

The war has not seriously affected this section. August 1, when war was declared there was a lull which continued for nearly a month but since then business has been above normal because of the unprecedented wheat market.

Early in the fall the banks were very tight with dealers, going so far as to endeavor to discourage the farmer buying cars. It had little effect. The farmer knows what he wants. Still the banker continues to harp on the money spent for cars going out of the state but forgets that the wheat he sells goes out of the state and the money comes back in. It is a poor law of business or finance that will not work both ways.

Minneapolis and St. Paul with a combined population of 535,000 are each year becoming a better closed-car market, and berlines, sedans and coupes are coming

into their own, slowly but surely. For a closed-car center few of the makers have given the distributors here the assistance they deserved, as the number of closed cars displayed at the show was lamentably small. In the gasoline field they totalled eleven, made up of four berlines, four sedans and three coupes. In contrast with these figures were thirty-four roadsters and 118 touring cars. The limousine cannot be considered; in short, it is, not here. The Twin city family prefers the berline with its removable windows or partition between the driver's compartment and the passenger compartment, so that the owner can drive if so inclined. Locomobile, Winton and Packard showed berlines; Overland, Cadillac, Franklin and Stutz had sedans; and Overland, Cadillac and Scripps-Booth showed coupes. The local dealer or distributor does not want to buy a berline or sedan from his factory for this show as the selling season is nearly over and he would have to carry it over for the fall of 1915, on the other hand a larger display of closed styles by the makers would serve to accelerate their introduction.

Closed cars sell best here from October

Pittsburgh Boasts Most Costly Open-Air Garage in the World



CARS PARKED IN FRICK OPEN-AIR GARAGE IN PITTSBURGH

BECAUSE of the generosity of H. G. Frick, one of America's wealthiest steel barons, Pittsburgh, Pa., can boast of having within its limits the most costly open-air garage in the world. When the municipal officials recently passed an ordinance prohibiting the parking of motor cars on the downtown streets for more than 30 minutes, the steel magnate came to the rescue of the perplexed motorists and loaned the Pittsburgh Automobile Club, a valuable piece of ground in the heart of the business district, to be used for the parking of cars until such time as he is ready to build upon it, which he may not do for several years. The lot covers an entire city block, being bounded by Fifth avenue, Grant street, Oliver avenue and Cherry Way, and is

said to be worth between \$4,000,000 and \$5,000,000. It is practically the only suitable parking place in the congested district of Pittsburgh for the business men and others who drive to their offices and leave their cars outdoors until they are ready to return home in the evening. The Lueulian garage has been fenced in and covered with cinders, while oil and gasoline stations and shelter houses for chauffeurs have been built by the club. A fee of 20 cents a day for storage is charged club



ENTRANCE TO PITTSBURGH GARAGE

members who now number more than 800, while non-members must pay a much higher rate. Thus the inducement to join the club is great. Advantage thus accrues to both the club and the non-club members as well, for those not members may use the open-air garage.

1 to December 1 and the orders generally are placed late in the spring and early summer. There is much talk of local body builders taking up the manufacture of closed type, in other words the trend of special closed bodies is moving westward from New York and Chicago.

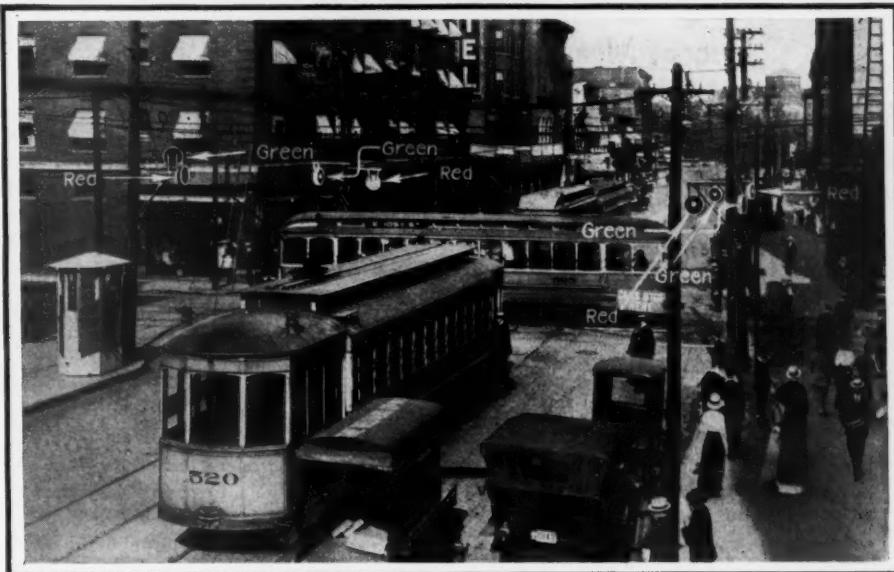
All week, in spite of the worst snow storm of the season, and in spite of temperature close to zero at times and in spite of more snow than this city is accustomed to, the motor cars were out every day and every night in full force. One night 150 cars were lined up in the open square in front of the armory, notwithstanding a blinding snow storm, and the next night nearly as many were counted under one of the clear, frosty nights for which this territory is noted. The great majority were touring cars well fixed up with tops and side curtains, in fact, you do not see a touring car here without top and side curtains up. The hoods are well bundled up with padded jackets and blankets. Looking at these cars and considering the push-ahead spirit of this territory one is very forcibly impressed with the field here for closed types.

Minneapolis and geography are always closely associated, just like New York and money, Chicago and stock yards, Washington and senators. Minneapolis is the flour city of the union, but in the motor industry the geography aspect of the city crowds out the flour phase. You get into a new range of distance here as compared with New York, or Boston. Here area is the dominating string.

The Minneapolis territory, area considered, is almost stupefying. Roughly, it embraces more or less of five states: all of Minnesota, North Dakota and South Dakota, the east half of Montana and a little northwestern corner of Wisconsin. The area looks big on the map but it is when you get it into figures that you start to comprehend the proportions. In area this territory is one-eleventh of our country including Alaska. It totals 316,000 square miles of country. Little New England with its six states has but 66,424 square miles. You could practically put five such areas into the territory that the Twin city motor car distributor has for his selling zone. No wonder out here they talk distributor not dealer.

But let us get a little more tangible grasp on this Twin city selling territory. The World almanac will aid us. This Minneapolis territory is almost equal in area to that of the following thirteen states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, Pennsylvania, Ohio, Indiana and Illinois. Is there any wonder that out here is the robust spirit, a roving spirit. This great territory is exactly one-half larger in area than either Germany or France. You could lose twenty-eight little Belgiums in it. It is over twice as large as Japan. Here are a few figures:

Cleveland Has Unique System of Traffic Control



SHOWING HOW CLEVELAND'S TRAFFIC CONTROL SYSTEM WORKS

After a 5 months' trial, a unique system of street traffic control, installed at the corner of Euclid avenue and East One Hundred and Fifth street, Cleveland, O., in August, has been stamped as practical and efficient since it has speeded up traffic 20 per cent.

Electric lights are placed on the right-hand side of each street facing oncoming vehicles. A red light denotes "Stop" and a green light "Proceed." The red light is shown on the near corner of the crossing and the green on the farther corner.

The officer who controls the switch is stationed in a booth to the left in the accompanying illustration. The sides of the booth are glass and this enables the officer to see traffic in all directions. The switch is so interlocked that it is impossible to give

conflicting signals. When traffic is opened in one direction, it is automatically closed in the other.

When an alarm is turned in at fire headquarters, an instrument in the booth notifies the officer so that he may clear the crossing for the passage of the fire apparatus. After throwing an emergency switch, which sounds an alarm bell and flashes red lights at all crossings, he is free to leave the booth and give his attention to the street.

Information can be dispensed without danger to pedestrian or officer. No conflicting signals are possible. Police officers are not exposed to all kinds of weather. Signals are effective both night and day. These are a few of the advantages claimed for the device.

	Square miles
Minnesota	84,682
South Dakota	77,615
North Dakota	70,837
Half of Montana	73,000
Wisconsin (part)	10,000

	Square miles
Maine	33,040
New Hampshire	9,341
Vermont	9,564
Massachusetts	1,248
Connecticut	4,965
New York	49,204
New Jersey	8,224
Maryland	12,327
Pennsylvania	45,126
Ohio	41,040
Indiana	36,354
Illinois	56,605

	Square miles
German Empire	208,780
France	207,054
Belgium	11,373
Japan	147,655
Russia	8,647,657
China	2,169,200

In the population chart the figures are not so formidable, but they are increasing very fast each year. The population of the whole Minneapolis territory is nearly 4,000,000, as compared with 6,552,681 in New England in 1910. But car buying is not in proportion to population, in other words, the number of cars owned for each

100 population is much higher in Minneapolis territory than in the New England zone.

CONTROL TRAFFIC BY ELECTRICITY

Milwaukee, Wis.—If the proposed recommendations of F. A. Vaughn, electrical engineer, now engaged in making an electrical survey of Milwaukee, are carried out, downtown traffic will soon be regulated by a system of lights and the large traffic squad turned into other police channels. Mr. Vaughn believes the handling of traffic at busy corners can be facilitated by at least 20 per cent. Under the proposed Vaughn system, electric signal lights are placed on the right side of each street facing oncoming vehicles. A red light signals "Stop" and a green light, "Proceed." The switch is under the control of a traffic officer stationed in a glass booth at the intersection. In this booth there is to be also a connection with the fire alarm telegraph system, so that the signalman is always informed if fire apparatus demands the right of way.

Legislatures Working on Motor Bills

Recent Measures Enacted and Discussed

WILMINGTON, Del., Feb. 6—Acts which have just been passed by the legislature make the following changes in the Delaware motor law:

1—The secretary of state shall revoke the license of any person convicted of operating a motor vehicle while under the influence of liquor.

2—The secretary of state is empowered to revoke the license of anyone upon three convictions of the motor law in any one period of 12 months.

3—All magistrates are required to notify the secretary of state of all convictions under the motor law.

4—Motor vehicles operated by a foreign corporation, firm or co-partnership must carry Delaware tags, except foreign dealers or manufacturers, where reciprocity is given according to the non-resident reciprocity clause.

5—The speed limit is increased from 12 to 15 miles an hour in cities and towns, slowing up at intersections of streets. On highways in open country the speed limit is increased from 20 to 25 miles an hour.

6—Motorcycles are required to carry a new style of tag and no one is permitted to operate a motorcycle except the one who obtains the registration.

7—Defining the family operator's license as including a husband, wife, son, daughter or other relative or person who lives within the house or domicile of the owner, but does not include a servant, hired help or professional operator.

8—Prohibiting dealers from operating more than one car at the same time under the same registration number.

9—Officials of fire departments are given the same exemption as the fire engines and apparatus when responding to an alarm of fire.

10—Only official tags issued by the state can be used on any motor vehicle or motorcycle.

COLORADO WOULD CHANGE LAW

Denver, Colo., Feb. 3—A bill for a law requiring that the state license fee for all gasoline motor cars be based upon the horsepower rating established by the Society of Automobile Engineers has been introduced in the Colorado legislature. The present law, which was passed 2 years ago and went into effect in July, 1913, provides that the fee shall be \$2.50 for cars up to 20 horsepower, \$5 for cars of 21 to 40-horsepower, and \$10 for cars above 41-horsepower, but there is no provision as to the formula of rating to be followed.

The bill provides also for a state inspector of motor car licenses. It is claimed that such an inspector is greatly needed because many cars are either improperly registered or not registered at all. The loss of revenue in this connection is estimated at \$5,000 a year or more.

Another feature of the measure is provision to enforce rules of the road, greater protection for travel being deemed necessary, especially in the mountainous districts.

Non-residents will be allowed 90 days' exemption from license tax as before, but they will be required to register at the first county seat reached in the state.

The best features of the present law are retained in the new measure, which is aimed to increase the state's revenue for good roads.

The bill is supported by the Denver Motor Club, Denver Automobile Trades Asso-

ciation, Colorado State Automobile Association and Colorado Good Roads Association. It also has been endorsed by Ralph W. Smith, Colorado vice-president of the American Automobile Association.

NEW CODE FOR WASHINGTON

Olympia, Wash., Feb. 5—After 4 weeks of strenuous labor the house committee on roads has finished the preparation of a motor tax code that will supersede all present motor laws in the statutes of the state of Washington. About \$300,000 will be raised by the operation of the law and the money will go into the public highway fund. The mode of collection will be fixed by the secretary of state through the county auditors.

Following is a list of the annual tax rates: Motorcycles, \$3; privately-owned passenger cars, 20 horsepower and under, \$5; same over 20 horsepower at the rate of 25 cents per horsepower; 1 to 2 tons, \$10; above 2 and 3 tons, \$15; above 3 and 4 tons, \$20; above 4 and 5 tons, \$25; over 5 tons, \$100; motor stages, five-passenger, \$7; seven-passenger, \$10; over seven and up to twelve-passenger, \$25; twelve-passenger and over, \$50.

A speed limit of 24 miles an hour is specified except in certain places where speed must be cut down to 12 miles an hour. The present law governing turnouts is reversed so that when one car is about to pass another going in the same direction the faster machine must turn to the left. Cars meeting must both turn to the right as at present. In cases of accident the driver would be required to stop and give his name and address to anyone who asks for it.

HUB MOTORISTS IN DILEMMA

Boston, Mass., Feb. 6—Massachusetts motorists, particularly those in Boston, are now trying to figure out just where they are at as a result of a new ordinance put into effect by the street commissioners of Boston, which reads:

"The crying of wares by vendors and peddlers, loud or boisterous speech by individuals or groups, playing of musical instruments, sounding of motorcar horns, other than reed horns, or the driving of horse-drawn vehicles faster than a walk are prohibited within 100 yards of a hospital."

As all violations of regulations provided by the street commissioners carry a fine of not more than \$20 the import is serious, as far as the motorists are concerned. At the present time many cars are not equipped with reed horns, and such an ordinance would require such equipment because there is a state law that says every motorist must sound a horn at inter-

secting streets. Therefore if he does not sound a horn because he has no reed one he comes under the state law, and if he does sound one of the loud horns he comes under the street commissioners' regulations.

Some of the motor attorneys claim that no city authorities may promulgate any ordinance that conflicts with a state law, the latter having precedence, and the fact that a motorist must sound a horn, and the state law not specifying what its nature may be that no court could sustain a judgment of guilty. The fact that the ordinance states within 100 yards of a hospital makes it all the more difficult to obey, particularly in Boston, where there are so many narrow streets. That the matter will be threshed out in the courts seems certain.

NEW JERSEY MAKES OUTCRY

Philadelphia, Pa., Feb. 6—That constant violations of the reciprocity privileges by Pennsylvania motorists have cost the New Jersey treasury approximately \$40,000 annually is the rather startling announcement of State Motor Vehicle Commissioner Job H. Lippincott, of that state, who has arranged for a detail of inspectors at the Camden ferries to apprehend the offenders. Philadelphia business houses and individuals are specifically designated as the most persistent violators.

According to Mr. Lippincott, a comparison of the Philadelphia and the New York motor license figures showed such exceptional discrepancies between the work of these two agencies that the department instigated a thorough investigation of the traffic relations between Philadelphia and suburban towns with New Jersey. The result showed that while \$69,155.97 was collected at the New York stations, the Philadelphia office of the department took in only \$8,349.50. The commissioner asserts that upward of \$40,000 is annually lost to New Jersey through abuse of the touring privilege by Philadelphia drivers.

The reciprocity privilege entitling motorists to the use of the New Jersey highways gives owners the right to enter and drive through that state on the license of their respective states providing the car is not kept in the state for a longer period than 2 weeks. Commissioner Lippincott asserted that it was no unusual occurrence for motorists to keep their cars at the summer resorts for the best part of the summer without obtaining a special license.

ANOTHER BURDEN PROPOSED

Harrisburg, Pa., Feb. 6—Several bills amending the Pennsylvania state motor laws and legislation providing for the improvement of the state's highway system have been introduced in the state legislature. One that is being vehemently protested by motorists, introduced by Henry Wasbers, of York, provides that no person shall be licensed unless he has passed an examination for physical fitness. The

bill does not state the fee that may be charged by the physician. However, it is estimated that such examination would average \$10 each, as competent physicians charge from \$5 to \$25 for such work. Motorists point to the fact that they already are paying for their cars or chauffeurs over a million dollars to the state for licenses and this would mean a million and a quarter more for physicians of Pennsylvania.

Backers of the bill contend that regulation of operation of cars is essential and that the sight, mental steadiness and strength of a driver is a matter of vital concern to the public.

Judson W. Stone, of Bradford, has a bill that requires all vehicles to display lights after dark, except wheelbarrows and wagons used for hay and straw.

The Pennsylvania Threshermen's and Farmers' Protective Association has prepared a bill which will repeal a section of a motor law of 1913, which taxes traction engines doubly, and specifies the kinds of cleats to be used. The bill divides traction engines into two classes, agricultural and hauling engines, and fixes the tax of \$5 for the former and \$10 for the latter. The use of standard cleats on wheels, instead of cleats $2\frac{1}{2}$ inches long, is provided for in the measure.

The legislative committee of the Free Highway League of Pennsylvania has drafted a bill providing for the official marking of the Lincoln highway across the state of Pennsylvania by the state. Among other bills introduced in the legislature are the following:

Authorizing second-class townships to levy a tax for maintenance of lights on public highways on occupations in addition to taxes now authorized.

Designating an addition to the state main highway system.

Appropriating \$3,000,000 to meet deficiency in money due to townships under dirt road aid acts.

OHIO FIGHTS CAR STEALING

Columbus, O., Feb. 8—Car owners and clubs in Ohio will back a bill which has been introduced in the Ohio general assembly providing for drastic penalties against any person who receives, buys, conceals or disposes of motor vehicles from which the manufacturer's serial number or other distinguishing marks have been removed, defaced or covered. Wholesale thefts of cars and the rebuilding of the same after removing the serial numbers will be made more difficult under this law if it passes.

The cities' committee of the house of representatives has killed the bill fostered by Senator Vorheis allowing garage and repairmen to sell motor cars within 10 days on which storage or repair bills are unpaid. The measure was believed to be too drastic and so little difficulty was experienced in sidetracking the bill in the legislature.

Activities in the Jitney Bus Field

San Francisco Announces Regulations

SAN FRANCISCO, Cal., Feb. 5—A San Francisco ordinance, recently put in effect, provides that no jitney bus shall be operated without a permit from the police commission, and a form of application for a permit is presented. Every application must be accompanied by a bond in the sum of \$10,000, which shall be given to the city and county of San Francisco, to pay any damage to person or property caused by the bus operator's negligence.

The police commission is authorized to withhold a permit if the bond is insufficient or the vehicle unsafe or the operator incompetent, or if "the public convenience would not be served by the operation of the vehicle along the proposed route."

The city authorities will retain the right to keep jitneys off the Municipal Railway routes or other streets. The route to be covered must be specified in every application and no jitney will be allowed on any route other than the one described. When a permit is granted a license charge, ranging from \$40 to \$100 a year, according to the vehicle's size, must be paid to the tax collector. Every jitney chauffeur must wear a badge, to be issued by the police commission, for which a deposit of \$1 must be made.

JITNEY BUS IN OKLAHOMA

Oklahoma City, Okla., Feb. 6—The jitney bus has invaded Oklahoma. The service has been installed at Oklahoma City, Muskogee, Tulsa, Sapulpa and Norman. Every effort is being made by the traction interests by every possible means to strangle the innovation in its infancy.

In Oklahoma City, when C. F. Elrick, a retired banker, placed six buses in the jitney service and announced that he was ready to accommodate all straphangers and began operating the jitney cars along the lines of the street railway company, the city commissioners, at the behest of the traction interests, promptly drew up a drastic ordinance for the regulation of jitney traffic.

Among the provisions of the ordinance is one making it unlawful for the jitney cars to operate more than two consecutive blocks upon any street occupied by a street car line within the fire limits of the city. Another is the requirement of a \$10,000 bond to protect the city against accidents and an annual license tax ranging from \$50 to \$150 per car.

Following the announcement of the proposed service two other companies were immediately formed to operate jitney service lines. With the passage of the ordinance which is contemplated to strangle the service plans were immediately outlined to make a test case of the ordinance as soon as it becomes effective.

Similar action has been proposed by the city authorities of the other cities of the state but definite action is not expected until the Oklahoma City test case has been settled.

JITNEY ASSOCIATION IN DISTRICT

Washington, D. C., Feb. 6—The Washington Jitney Bus Association has been formed with Andrew I. Hickey as temporary chairman. It is planned to put the service in operation on March 1 and it is expected 200 car owners will register with the association. Plans for the inauguration of the service are now being discussed. It is to have some sort of parade or other function in which several prominent government officials will participate.

LOUISVILLE AFTER JITNEY LINE

Louisville, Ky., Feb. 8—Within a few weeks Louisville will join the cities in which jitney bus lines are in operation. Third street and Broadway will have the first two lines, according to the officers of the Nickel Automobile Co., which concern, with a capital stock of \$10,000, has filed articles of incorporation in the office of the county clerk. At first it is planned to operate ten motor buses, carrying from ten to twelve passengers each. Expansions are proposed for the future by this concern. William A. Baker is president of the organization; Stephen S. Jones, vice-president; W. P. McDonogh, secretary, and Louis C. Heck, Jr., treasurer.

Another jitney bus line project is said to be under consideration by R. M. Cunningham, a local lumber man, and his associates.

JITNEYS POPULAR IN DALLAS

Dallas, Tex., Feb. 6—The jitneys in Dallas are causing a heavy loss to the street railway company. At this time there are more than 100 jitney cars in operation in Dallas, going from the business section of the city into every part of the residential districts. It is understood during the coming week sixty more of the cars are to be put in operation. The Texas legislature has just refused to legislate against the jitneys which probably mean more such cars in Texas cities. Jitney owners in Dallas are to meet this week and perfect an organization.

WIRE WHEEL COMPANY MOVING

Columbus, O., Feb. 4—The F. & H. Wire Wheel Co., of this city, is moving its plant to Springfield, O., in order to take advantage of increased manufacturing facilities and thus be able to increase its output.

The Readers' Clearing House

NOVEL KIND OF RECORD CLAIM

St. Petersburg, Fla., With 10,000 Population, Has 52 Makes

ST. PETERSBURG, Fla.—Editor Motor Age—I have studied the list recently published in Motor Age giving the names of the 1915 makers. Having always been of the opinion that this city had more different makes than any other place of the same or even greater population, 10,000, I have checked off the various cars represented and find that out of a list of 116 we have fifty-two different makes. This does not represent the total number as we have a number of past types such as Loziers, Atlas, Halladay, Schaeft, etc. I think this is an exceptional showing and believe it unmatched in the United States.—A. W. Fisher.

READER UPHOLDS THE CYCLECAR

Says Type, Which Has Been Supplanted by Light Car is Efficient

Indianapolis, Ind.—Editor Motor Age—During the past few weeks I have read several comments in the motor trade papers for and against the cyclecar. One writer, a mechanical engineer, upholds the vehicle, commenting favorably upon its merits. He speaks from experience and evidently feels that the little car has every right to be recognized and used. Another writer comes forth with the query "Why buy a cyclecar when you can purchase a light car that looks much more like a motor car for a slightly greater price?"

The owner-operator of a good cyclecar can see no logic in this question or argument. For example, I have been using a cyclecar for the past 18 months which has been driven 8,900 miles, probably one-third of this being on country roads. While I never have regarded the cyclecar as a touring car in any sense, still I have used this car with the greatest satisfaction on a number of trips which would be classed as touring by many motorists. A short account of the trip may be interesting.

I started one morning last fall with a passenger and suitcase, and in 5 days I visited nine towns varying in population from 270,000 to 2,700 in two states, calling upon an average of four firms in each town, traveled 396 miles, used 10 gallons of gasoline, and 2 quarts of oil, had one puncture, and no other trouble or adjustments. This is typical of many other similar though shorter trips.

In the design of this car no attempt was made to imitate the motor car. Why? The car was designed to carry two persons at the minimum of expense, and with the maximum of comfort, it weighs just 700 pounds with top and windshield, the designer has however admitted to the writer that in the future he could reduce this weight by nearly 100 pounds. It is narrow, being 42 inches over all. This saves many minutes every day as it can slip like an eel through traffic than retards the standard tread vehicle.

"What do you do on country roads?" Many who ask this question have to be told that country roads have improved during the past 10 years and are still improving rapidly.

As for all-the-year-round service, I have driven my car every day this winter and this in view of the fact that at one time we had 13.4 inches of snow in 4 days, nearly all of which is still on the ground. I have not, of course, driven through 13 inches of unbroken snow, as the car has only 8½ inches of road clearance under the floor of the car, but had no special difficulty in negotiating the four squares between my home and the car line, and following

same to my destination without trouble.

During November, December and January, I have averaged 65 miles per week, a 5-gallon can of gasoline lasting nearly 3 weeks, and a quart of oil 5 weeks. This is more gasoline and less oil than I use per ride in the summer months.

I feel that if a few 600 or 700-pound cars were used in each town with even one-half the satisfaction which I have derived from mine, you would soon be reading of the return, instead of the passing of the cyclecar.—Wolverine.

WHICH IS CHEAPER, EIGHT OR SIX?

Former will Probably be Lower in Cost with Large Production

Monticello, Ark.—Editor Motor Age—Which is the cheaper to build, a six-cylinder car or an eight-cylinder? The same material to be used in both, and the horsepower of both engines being the same.

2—How many passenger cars does the Packard Motor Car Co. build in 1 year?

3—What is the maximum speed of the 1914 Studebaker six? Also the 1914 Jeffery 48 six, Stutz six, and National six?

4—How does the weight of the Edison storage battery compare with the Willard battery of the same voltage and amperage?

5—Do Edison batteries require water, as others do?

6—Does it corrode and spill, as some of the other batteries do?—E. Hardy.

1—This cannot be answered definitely. It is possible to build an eight which will cost more than a six of the same horsepower and it also is possible to build one which will cost less. With production very high the cost of the eight probably will come lower than that of the six.

2—During the year 1914 the Packard company turned out 3,612 cars.

3—All the cars you name will travel 55 miles per hour or over.

4—It is said to weigh about $\frac{1}{3}$ less.

5—Yes.

6—You use the word corrode wrongly. You evidently refer to a deposition of salts during the charging operation. In the Edison there may be a slight deposit on one of the terminals. As to spilling, the Edison battery uses a liquid electrolyte which will spill under certain conditions just as a lead battery will spill. If the battery is kept upright and the vent caps in good shape the solution will not spill.

IN DOUBT ABOUT HUMMING GEARS

May be Caused by Worn Teeth or Warped Metal—Adjustments

Payette, Idaho—Editor Motor Age—Why are two windings, in opposite directions, used in each coil of the Ford magneto?

2—What would cause excessive humming in the differentials or transmission of an E. M. F. 30 car?

3—How may differential gears of an E. M. F. be adjusted?—A New Subscriber.

1—Apparently there is no other reason for this except to get two ends at the bottom of the spool.

2—If the humming is even, that is, if there are no stresses in the sound at in-

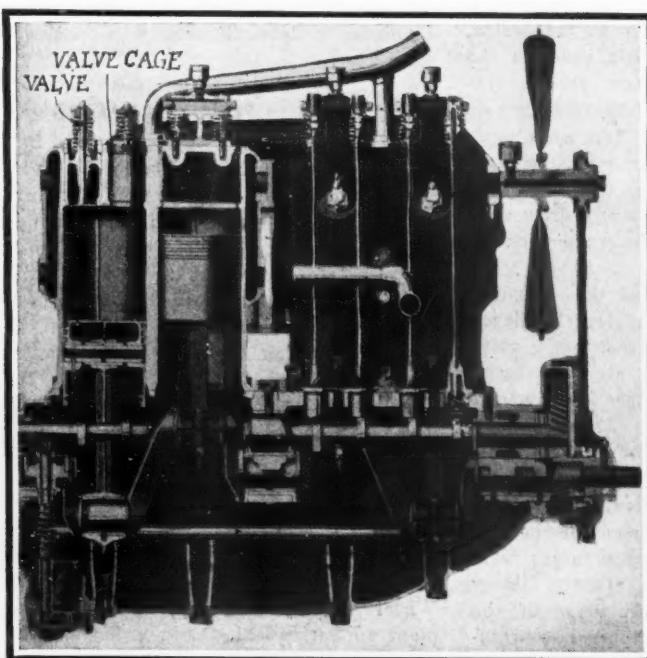


Fig. 1—Sectional view of the Buick motor showing the valve cages, which are clamped in place in the cylinder head

tervals the gears themselves may be in good condition but with too much backlash between the driving pinion and ring gear. If the hum is not steady it may be caused by one or more gear teeth being worn too much, or the ring gear being warped out of shape.

3—When worn too much it cannot be adjusted. The cost of new gears is not too high for one to consider replacement.

SUGGESTS EASY STARTING METHOD
Tells How to Make Ford Motor Easy to Crank in Cold Weather

West Union, Ia.—Editor Motor Age—As W. J. Walters in the January 21 issue of Motor Age would like to hear of remedies concerning difficulties of cold weather starting, I suggest the following method for a Ford car. Jack up one rear wheel and release the hand brake lever to a point just before it makes high speed connection.

When the above method is used, the engine will crank much easier. The rear wheel will spin as though the clutch was in. The clutch should be kept out for safety, should the car drop off the jack.—W. J. Probert.

ROUBLE WITH MISFIRING MOTOR
Engine Acts Queerly With Throttle in a Certain Position

Cisne, Ill.—Editor Motor Age—I have a Ford, model T, which misfires when the throttle lever is on about the third or fourth notch of the quadrant, but if it is moved a notch or two in either direction the motor will run normally. Will Motor Age kindly give the cause and remedy for this?

2—Kindly explain the adjustment of the float of the Holley model H-3 carburetor used on the 1913 Ford car.—A Reader.

1—It sometimes happens that a certain position of the throttle will cause misfiring due to the fact the carburetor is poorly adjusted. However, if you refer to the spark lever, the trouble is caused by improper setting of the timer or looseness in the rotating arm of the timer.

2—The float is not adjustable.

FREEZING POINTS OF SOLUTIONS
Meaning of 100 Proof Alcohol—Refers to Solution of Liquid in Water

Chicago—Editor Motor Age—Denatured alcohol, as delivered in barrels, has a government stamp on it showing, among other things, the

Questions Answered and Communications Received

A. W. Fisher..... St. Petersburg, Fla.
Wolverine..... Indianapolis, Ind.
E. Hardy..... Monticello, Ark.
W. J. Probert..... West Union, Ia.
A Reader..... Cisne, Ill.
A New Subscriber..... Fayette, Idaho.
B. I. Whiting..... Chicago
T. H. Sparks..... Eureka Springs, Ark.
A. Subcriber..... Bloomington, Wis.
G. V. Daily..... Exeter, Neb.
An Owner..... Altus, Okla.
A Subcriber..... Goshen, Ind.
Car Owner..... North Platte, Neb.
A Subcriber..... Danville, Ill.
Subscriber..... Elma, Ia.
W. L. S. Drinkwater, Saskatchewan, Can.
A. DeLugor..... Warsaw, Russian Poland
F. E. Brian..... Sumner, Ill.
Old Reader..... Inland, Neb.
J. W. Rounds..... Star, Idaho
No communication not signed with the reader's full name and address will be answered.

number of wine gallons, and the number of proof gallons. Kindly differentiate between the two.

2—What is meant by 188 and 100 proof alcohol?

3—At what temperature will pure, 188 proof alcohol, freeze?

4—Will it freeze solid or mushy?

5—At what temperature will 75 per cent of 188 proof alcohol and 25 per cent water freeze?

6—Give the freezing points of the following mixtures:

50 per cent alcohol, balance water.

40 per cent alcohol, balance water.

33 1/3 percent alcohol, balance water.

25 per cent alcohol, balance water.

20 per cent alcohol, balance water.

10 per cent alcohol, balance water.

7—Will a 33 1/3 per cent solution freeze solid finally after freezing mushy?

8—What are the two or three reasons for not using solutions of only glycerine and water in radiators to keep them from freezing? Does it eat the rubber, or clog the radiator or pump?

9—Give the freezing points of the following glycerine and water solutions:

100 per cent glycerine.

50 per cent glycerine, balance water.

25 per cent glycerine, balance water.

20 per cent glycerine, balance water.

12 1/2 per cent glycerine, balance water.

10 per cent glycerine, balance water.

5 per cent glycerine, balance water.

10—What is the chemical formula for pure glycerine?

11—An objection to the use in radiators with a thermo-syphon system of circulation, of the solutions of water, alcohol, and glycerine, as published in the October 22, 1914, issue of Motor Age, has been mentioned to me. It was that the slow circulation did not keep the glycerine mixed with the alcohol and water, as a result of which it was claimed that the glycerine settled in the lower part, sometimes eating the hose connection. Is this true in all cases of thermosyphon radiators?

12—Is it the opinion of Motor Age that the circulation in Ford cars is strong enough to keep the solution as suggested, mixed?—B. I. Whiting.

1—Wines are measured by weight and not volume and a wine gallon weighs 8 pounds. A proof gallon is the ordinary one containing 8 pints.

2—The U. S. government has set certain standards and one of them is that for alcohol which in solution with 5 per cent water is said to be a 180 proof alcohol. In the drug shop you will see bottles with labels stamped 95 per cent alcohol. This is 180 proof. Alcohol of 100 proof would be about 42 per cent alcohol.

3—At about 50 degrees below zero.

4—In freezing, a certain portion may become solid and the remainder stay in the liquid state, the frozen crystals floating around become larger and larger gradually and soon the mass is solid.

5—At about minus 40 degrees.

6—The freezing points of the solutions you name are approximately as follows:

Alcohol 50 per cent, water 50 per cent,

—25 degrees.

Alcohol 40, water 60, —23 degrees.

Alcohol 33 1/3, water 66 2/3, —10 degrees.

Alcohol 25, water 75, —2 degrees.

Alcohol 20, water 80, 5 degrees.

Alcohol 10, water 90, 18 degrees.

7—Yes.

8—It acts on the rubber connections and may form a sticky mass in the cooling jackets.

9—The approximate freezing points of the solution you name follow:

Glycerine 100 per cent, —40 degrees.

Glycerine 50, water 50, —2 degrees.

Glycerine 25, water 75, 19 degrees.

Glycerine 20, water 80, 23 degrees.

Glycerine 12 1/2, water, 87 1/2, 26 degrees.

Glycerine 10, water 90, 28 degrees.

Glycerine 5, water 95, 30 degrees.

10—The chemical formula for glycerine is expressed $C_3H_8(OH)_3$.

11—This is not true in all cases, as there usually is sufficient circulation to keep the liquids in solution.

12—Yes.

USING THE BATTERY AND MAGNETO

Two Cannot Be Connected in Series—Gear Ratios of Cars

Eureka Springs, Ark.—Editor Motor Age—Why is it that the Atwater-Kent ignition will not work on the magneto?

2—Could the magneto be connected with dry batteries and both currents be used at the same time with this ignition?

3—What is the low gear ratio of the Ford, Buick 37, and Mercer 35?—T. H. Sparks.

1—Motor Age does not quite understand what you mean. The Atwater-Kent is a battery ignition system using a storage battery, coil and combination timer and distributor.

2—No. A magneto generates alternating current and a storage battery direct current. The two currents cannot be used together.

3—The gear ratio of the Ford car on first speed is 9.9 to 1; of the Buick 37, 14 to 1; of the Mercer 35, 1913, 8 to 1.

SIX-CYLINDER CAR STARTS EASY
Three Explosions per Revolution Makes Chances of Initial Firing Greater

Bloomington, Wis.—Editor Motor Age—Does a magneto give a hotter spark with the lever in retard or advance position when the motor is going from 150 to 250 r. p. m.?

2—Does a six-cylinder start easier on the magneto than a four; as does not the armature on a six-cylinder magneto go more revolutions to the crankshaft than does one on a four?

3—Of the four-speed cars do the majority have direct drive on third or fourth speed?

4—Is there any need of having the sediment washed out of a storage battery before it shorts out, or should it be cleaned at regular intervals, even though it seems to be in perfect condition?

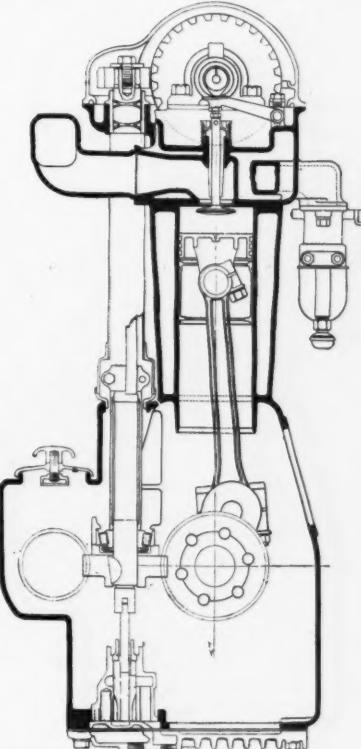


Fig. 2—Section through the Weidley motor which shows the valves mounted in the head. No cages are used in this type.

5—Would a carbon deposit act any different in a high-speed engine than in one of a large bore and shorter stroke?

6—Does the Zenith Carburetor Co. make a "Ford Special" carburetor; if not, would one of the size required be practical on a Ford?—A Subscriber.

1—The heat value of the spark at 150 and 200 r. p. m. is practically the same.

2—The magneto in a six travels one-half as fast as the crankshaft just as it does in a four-cylinder motor. The reason a six may start easier on the magneto is because in one revolution of the crankshaft there are three explosions whereas in the four there are only two. This makes the chances of firing a charge, greater in the six than in the four.

3—The majority have direct on third.

4—An ignition battery, with rather thick plates, may not need cleaning of the sediment trap for 1 year or perhaps two. In starting and lighting batteries the period is longer and usually the plates need replacement when the sediment trap is filled to any extent.

5—No.

6—The Zenith company has recently announced, its model O carburetor which is designed for use on small cars such as the Ford.

GEARSET LOCKED IN FIRST SPEED

Peculiar Action of a Ford Car Easily Explained—Speed Pedal Stuck

Altus, Okla.—Editor Motor Age—What can cause the transmission of a Ford car to lock in low gear when the low speed band is free?

I had been pulling my car in a hard pull in low and after getting on good roads again I went to throw it into high, but as soon as I did this, it killed the engine. I then tried to crank it up and found that the car would creep. I jackeded up the rear wheels and started the motor. Next I took the cover off the transmission and the low gear drum was stationary. I then loosened up the band on the low gear until it was very loose but this did not remedy it. I then gave up trying and started to run on low. I did not have to hold my foot on the low pedal at all. After running about 3 miles I stopped to get water and had to kill the engine, so when I cranked it again I tried to start without jacking up the hind wheel. I turned the motor over three times and it did not go. The next revolution I felt something give. I then cranked up the engine and found that it would run in low and high. It has never given any trouble since.—An Owner.

The unusual action of which you speak is explained easily. At the end of the control lever is a cam and this cam comes in contact with a set screw, but it does not remain in contact long. Should the cam be caught on the set screw, which is on the low-speed clutch pedal, the car will remain in low all the time. In your case the cam and set screw were in contact and hence the car ran along in low all the time. By manipulation of the lever you threw the two parts out of contact.

TYPES OF VALVE-IN-HEAD MOTORS

Some Use Cages, Others Do Not—Maker of the De Dion

Exeter, Neb.—Editor Motor Age—Define the cage type, valve in head motor.

2—Are the motors used in the Buick cars of this type?

3—Kindly show the superiority of the L-head over the T-head motor.

4—Give the address of the factory manufacturing the foreign-made de Dion.

5—Can a de Dion catalog be secured from any place in America? If so, kindly give the name and address.

6—What make or makes of motors are used in the 1915 Reo models?—G. V. Dally.

1—A cage-type valve-in-the-head motor has the valves mounted in cylindrical cages as they are called. These cages are provided with a passage for either inlet or exhaust as the case may be. The cage shown in Fig. 1 is clamped into an opening in the cylinder, but sometimes a threaded cage is used. In the motor shown in Fig. 1 is clamped into an opening between the cage and the cylinder thus making the joint gas-tight. The advantage of this construction is that it allows of easy valve grinding because a turn of the cage removes it as a unit with the valve.

In the construction shown in Fig. 2 no cage is used, as is clear from the illustration, which is a section of the Weidley motor. In most of the constructions, which do not use cages a removable cylinder head is employed.

2—Yes.

3—The only advantages of any importance are simplicity and cost. The L-head motor has but one camshaft and so it is simpler and lighter than a T-head of the same size. Its cost is reduced because of the elimination of certain mechanism.

4—The De Dion is made by De Dion Bonton & Co., 36 Quai National, Puteaux, France.

5—The American agent for the De Dion is the De Dion Bonton selling branch, 1649 Broadway, New York.

6—The motors used in the 1915 Reos are made by the Reo company.

DEFICIENCY IN STREAMLINE BODY

States Makers Have Neglected Points in Body Design

North Platte, Neb.—Editor Motor Age—Car manufacturers lately have paid much attention to streamline bodies horizontally, but little to streamline bodies vertically. Most cars have shelves and flat surfaces where dust readily collects. This is particularly true between the running boards and the bodies of most cars. These require frequent dusting and cleaning.

In fact everything should be done in designing a car body to reduce the number of square inches of surface to the lowest number possible, and particularly horizontal surfaces, which readily accumulate dust and moisture from rain and snow.

The removal of the radiator cap is a step in this direction and should be encouraged. Did any manufacturer ever figure that an aluminum or iron pipe could be used to connect motor and radiator, and that such pipe could contain water filler connections and an indicator of the level of the water in the radiator.

It could also act as a firm stay to the top of the radiator and do away with the stay rod now commonly used.

With such a device, when the hood would be removed, there would be nothing to interfere with complete access to the motor.

A peculiar thing about most cars of today is they have a piano finish, and that the owner is expected to use such cars in sand, mud, rain and storm, and in all kinds of places, where this beautiful finish is sure to become marred. Some finish ought to be substituted, which would be nearly as beautiful, and which would make the car look much better after use of 1 or 2 years than the present car of piano finish looks after that much use.

There is one car on the market that has an arrangement by which the back of the front seat can be folded down and the cushions used as a mattress for a bed. Many car owners have had their cars altered so that they can so be used. The motor car has become a common means of touring and certainly a bed in a car would be more luxurious than a bed in a tent or in many hotels where the owner might chance to be when night arrived.

As a whole, manufacturers have not been paying as much attention to up-to-date and convenient body designs as they have to motor improvements.—Car Owner.

ASESTOS ROPE GOOD FOR PACKING

Should Be Graphited Before Being Used—Drilling Piston Oil Holes

Goshen, Ind.—Editor Motor Age—What is the best process for removing emery from cylinders after they have been reground?

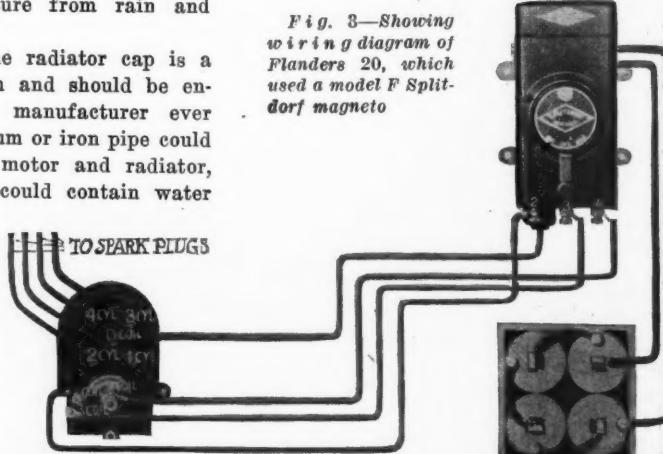
2—What is the best material to use for packing around shafts and bearings in transmissions of large diameters which will not allow high pressure, as in a small stuffing box?

3—Is it good practice to turn off at an angle a small part of the lower shoulder of the lower ring groove and bore holes downward in this to lead oil back and prevent it from reaching the top of the piston and valves in the motors which have been somewhat worn, but would not justify fitting new pistons?—A Subscriber.

1—Immerse the entire cylinders in kerosene and then spray the interior with air from a high pressure line. This should be repeated three or four times. An alternative method is to immerse the cylinder in a boiling solution of soda in water and then use the air spray. After the soda bath clean with kerosene and air.

2—Graphited asbestos rope is probably as good as any packing, although the mar-

Fig. 3—Showing wiring diagram of Flanders 20, which used a model F Splitdorf magneto



ket affords many fibrous packings which give good results.

3—This is good practice and is used in a number of motors.

CHARGING PERIODS DURING WINTER

Accumulator Should Receive Attention
Every 2 Weeks—Using Tire Talc

Sumner, Ill.—Editor Motor Age—Could there be black material of some kind added to the formula for body polish, given in a recent issue of Motor Age, to keep its black color or to keep it from fading out?

2—What is the cause of inner tubes becoming cemented or fastened to the casing so it is very difficult to remove them?

3—What is the cause and remedy for the clamp holding the spring to the rear axle on a model B-25 Buick having side play?

4—Is it practicable to charge batteries with the generator on the car? If so, how often, and how long should the engine be run?—F. E. Brian.

1—You can add a very small amount of black enamel to give the polish a tint. Use the enamel sparingly for otherwise you will streak the body.

2—This is caused by neglecting to use enough tire talc between tube and casing. Whenever a tube is placed into a casing always sprinkle talc over the inside of the tire. Talc is a white powder which is cheap and may be bought at any supply store.

3—The clamp is held in place by a key which may have dropped out. Motor Age suggests you see a Buick service man about this matter.

4—During the winter the battery should be charged every 2 weeks. You can use the generator on the car for this. The engine should be run long enough to cause the battery to show a gravity of between 1.280 and 1.300.

FORMULA DON'T CONSIDER SPEED

Comparing Horsepowers of Motors at Different R. P. M.

Star, Idaho—Editor Motor Age—In Motor Age issue of December 17, page 33, appeared the horsepower formula to be used in determining the horsepower of motors to be taxed in California.

According to said formula, it appears that a small cylinder will develop more horsepower per cubic inch of cylinder displacement than a large cylinder. Other things being equal. Is this correct, or is the California rating wrong?—J. W. Rounds.

Both the California formula and the S. A. E. will apparently give the smaller motor the greater horsepower per cubic inch of displacement until the r.p.m. of the motor is considered, and then they will not. For example, a 4 by 5-inch, four-cylinder motor and a 4 by 6-inch motor have the same rating, but this rating is at different engine speeds in both cases. In the 4 by 5-inch motor the S. A. E. rating of 25.6 is at 1,000 feet per minute piston speed, or at 1,200 r.p.m., while the 4 by 6-inch motor gives that rating at 1,000 r.p.m. Take two motors of different bore and the same stroke, meaning they reach their rated horsepower at the same r.p.m. and the horsepower per cubic inch of bore will be greater for the larger motor. Thus, a 4 by 6-inch, four-cylinder motor has a rating of 25.6 at 1,000 feet per minute pis-

ton speed and a displacement of 301.6 cubic inches. A 5 by 6-inch motor has a rating of 40 at the same piston speed. It has a displacement of 471.2 cubic inches. The horsepower per inch of bore in the smaller motor is .84 and in the larger motor about .86.

While the California method of determining the taxable horsepower is probably sufficiently close for the purpose it cannot be considered exact inasmuch as the speed of the motor, upon which the horsepower depends, is not considered.

S. A. E. FORMULA CONSIDERS STROKE

Figure Is Not Taken Into Consideration
Directly—Results Are Accurate

Elma, Ia.—Editor Motor Age—Kindly explain why the S. A. E. in giving the formula for figuring the horsepower of a motor does not take into consideration the stroke of the motor.

By the S. A. E. rating, a motor having a bore of 3½ inches and a stroke of 5 inches, figures out to have 19.6 horsepower, but certain concerns making a motor of this size rate it at 30 horsepower. If this is through the long stroke, why does the S. A. E. not take it into consideration?—Subscriber.

1—The S. A. E. horsepower formula does take the stroke into consideration, although not directly, and the formula gives accurate results in nearly every instance. It should be borne in mind that the formula gives the horsepower at 1,000 feet per minute piston speed. Thus, a 4 by 6-inch, four-cylinder motor has a rating of 25.6 horsepower at 1,000 feet per minute piston speed, or at 1,000 r.p.m. of the motor. A motor of 4 by 5 inches has the same rating, but it does not show the 25.6 horsepower until it reaches 1,200 r.p.m., which is equivalent of 1,000 feet per minute piston speed for a motor with a 5-inch stroke.

You can find the r.p.m. of any motor at 1,000 feet per minute piston speed by

$$6xF$$

using the following formula: $R = \frac{6xF}{S}$

Where R is the r.p.m. desired

F, the piston speed, or 1,000

And S the stroke in inches.

Thus, a 5-inch motor at 1,000 feet per minute piston speed will show

$$6 \times 1,000$$

or 1,200 r.p.m.

5

BIG MARKET IN POLAND HE SAYS

Believes American Builders Should Take Advantage of Opportunity

Warsaw, Russian Poland—Editor Motor Age—I have been an American citizen for the past 8 months and have been looking around this locality, and in my opinion there is a great future for the motor car business here. Because in this country, with a population of over 180,000,000, there is no motor car factory. Up to this time the local market was in the hands of German merchants, but now it is open to Americans.

On account of not having enough money to do this business myself, I suggest some

manufacturer should send his representative to Warsaw and start a motor car business.

Agents from different countries are looking for trade in Russian Poland and it would be worth while for American builders to act quickly.—A. DeLugor.

TIMING A TWO-CYLINDER AUBURN

Camshaft Gear Was Replaced in the Wrong Position—A Peculiar Knock

Drinkwater, Saskatchewan, Can.—Editor Motor Age—What model Schebler was used on the 1909 two-cylinder Auburn?

2—The gearset of this car is of the planetary type. When the low-speed pedal is pushed down to start there is a knock heard from the gearset. This knock comes at regular intervals. What may be the cause of it?

3—The motor was overhauled last year and a new timing gear put in to replace a broken one. Since then it hasn't the power it had before it was overhauled. How would a person verify the timing?—W. L. S.

1—The car used a model D Schebler carburetor.

2—Owing to the speed of the motor in starting out on low speed the knock you speak of possibly is at the outer bearing or transmission shaft bearing, where the car is cranked. The dust and dirt continually working in this babbitt cuts out the bearing sufficiently to produce a knock at this point. This bearing has a babbitt lining and must be poured to fit the shaft.

3—The valve timing of the two-cylinder Auburn is as follows: Inlet opens 15 degrees of crank movement past top dead center and closes 30 degrees after bottom dead center; exhaust opens 45 degrees before bottom center and closes 5 degrees past top center.

Trouble With a Cutting Car Clutch

Danville, Ill.—Editor Motor Age—I have a Cutting 1913 T 55-5, with a dry-disk clutch, which has been giving some trouble. In low or first and second the clutch takes hold all right, but in high it seems to slip. It has been cleaned and adjusted, which improved it some. Is the spring too weak?

2—What is the proper length of clutch spring?

3—What is the best packing to use in repacking the stuffing box on the motor back of the flywheel on a Wisconsin motor which leaks?

4—Does the Clark-Carter Motor Car Co. still manufacture the Cutting car at Jackson, Mich.? If not, who is now manufacturing it?—A. Subs.

1—The spring may be weak or poorly adjusted. There is a means of adjusting the spring which if done will stop the slipping to a great extent. Give the clutch a bath in kerosene to remove all gummy deposits on the plates.

2—Motor Age does not know the length of the spring. You can obtain this from L. C. Erbs, Jackson, Mich.

3—Use asbestos rope saturated with graphite in oil.

4—The Cutting car no longer is manufactured.

Wiring of Flanders 20

Inland, Neb.—Editor Motor Age—What model Splitdorf magneto was used on the Flanders 20, 1909 and 1910 models?

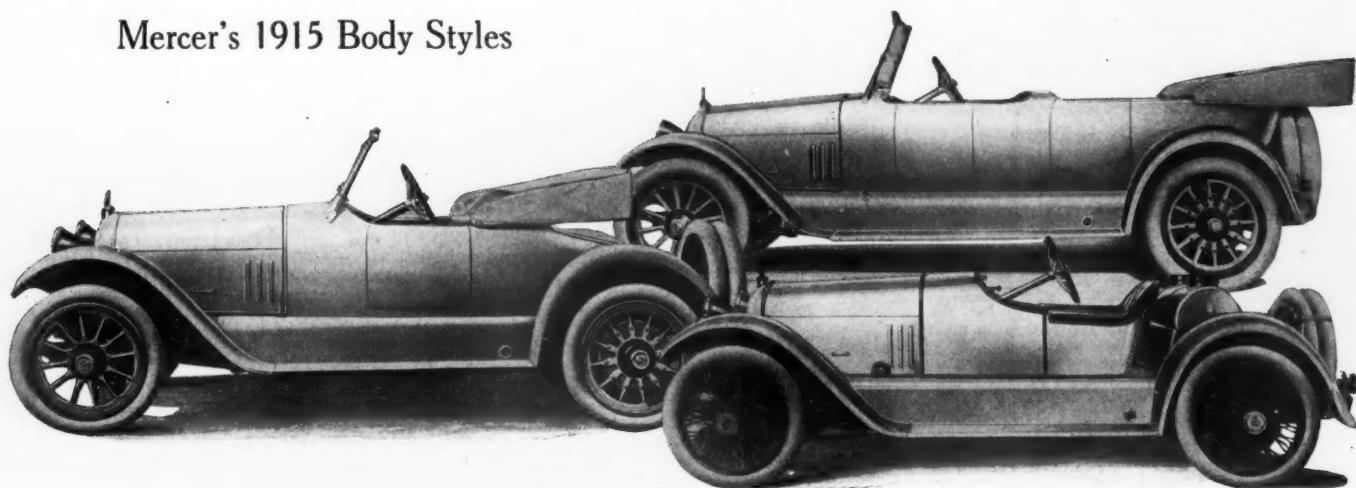
2—Kindly give a diagram showing how the battery wires should be connected from the coil to the magneto.—Old Reader.

1—The model F Splitdorf was used.

2—The wiring diagram showing these connections, is illustrated in Fig. 3.

Two Cars from New Factories Make Their Appearance

Mercer's 1915 Body Styles



THREE OF MERCER'S LATEST STYLES: SIX-PASSENGER TOURING, RUNABOUT AND RACEABOUT

THREE new body styles of the 22-70 Mercer series are announced. One of these is the six-passenger touring model, which, although a little larger as far as the body is concerned, is built along the same lines and is equally as pleasing as the four-passenger sporting model announced earlier. Both models are distinctive in their streamlining, which is carried out completely in graceful curves in every part of the hood, body, fenders, etc.

A second new body is the raceabout model, built along the lines of modern racing cars. Unlike many of this type it is upholstered in such a way as to be very comfortable for ordinary everyday driving. The car is designed primarily for the amateur sportsman who wants to use his car for general driving and occasionally wants to enter local race meets. The raceabout has a guaranteed speed of one mile in 48 seconds.

The third is a runabout, particularly adaptable to the needs of a man wanting carrying room for only two people, but who wants all the comfort and convenience of the larger models.

Low center of balance, which always has been a marked Mercer feature, together with the special spring suspension, gives a noticeable absence of side sway when the car is traveling at speed. An idea of the reason for this easy riding is obtained when it is considered that the semi-elliptic rear springs are 58 inches in length.

STROUSE CAR MAKES APPEARANCE

The S. R. K. Motor Co. has been organized in Detroit, Mich., to make the Strouse light car. The capital stock of the new company will be \$100,000, none of which will be offered to the public. The incorporators are Clarence E. Strouse, designer of the car; F. T. Ranney, a real estate dealer, and Thomas D. Wright, a retired Chicago lawyer. The Strouse car has a four-cylinder block Hermann motor, 2½ by 4, 100-inch wheelbase, tread either 42

or 56 inches, 28 by 3 front and rear tires, friction drive, and will sell for \$325 with the small tread and for \$350 with the standard tread.

JONES SIX FROM WICHITA

Announcement of a new car comes from Wichita, Kan., in the form of the Jones Six, the product of the Jones Motor Car Co. The car is assembled from standard parts and the location of the factory in the heart of the middle west is believed by its promoters to provide advantages from a market viewpoint that would not be present if manufacturing were to be carried on further east. Advantages in the way of freight charges for consumers in that territory are urged, as it is held that the knock-down parts can be brought to the west at a lower shipping cost than could the completed car.

The new car appears as a five-passenger, six-cylinder touring car of 118-inch wheelbase at \$1,150. The motor is built by the Lycoming Foundry & Machine Co., and has T-head cylinders, 3½ by 4½, three-bearing crankshaft, thermo-syphon cooling, Remy distributor ignition, combination splash and pressure oiling, Stromberg carburetor with vacuum fuel feed.

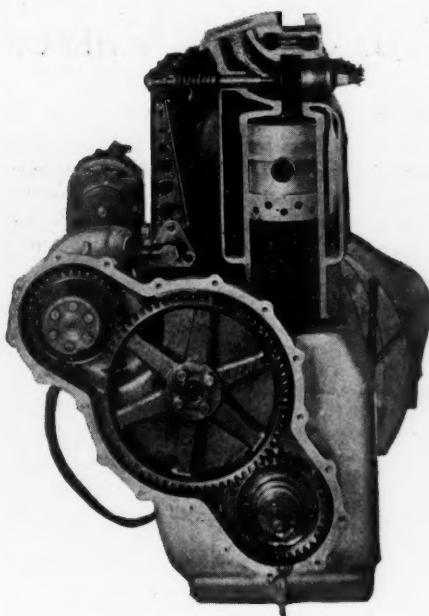
The clutch is a steel cone that provides its own spring action. The gearset is a four-speed selective type bolted directly to the motor, and is a part of the unit power plant. Final drive is through a single universal, inclosed in a torque tube, the drive taken through three-quarter elliptic springs. Tires are 34 by 5, and equipment includes Q. D. demountable rims with a spare on the rear. Starting and lighting is provided by a Leece-Neville system.

CAPITAL TO BUY TRUCKS

Washington, D. C., Feb. 6—The secretary of the treasury has issued a call for sealed proposals for furnishing the various executive departments in this city with gasoline and electric trucks during the fiscal year beginning July 1, next. The bids will be opened at 2 o'clock, March 10, by the general supply committee. The number of trucks required is not given. Strict specifications have been issued to which bidders must closely adhere. Detailed information, together with proposal blanks, can be obtained upon application to the general supply committee, Auditor's building, this city.

NEW STROUSE SMALL FOUR
TO SELL AT \$325





END VIEW OF NEW DUESENBERG, SHOWING CYLINDER DESIGN AND VALVE OPERATION

THE Duesenberg Motor Co., St. Paul, Minn., which has made a remarkable showing for its motors in speed contests the past few seasons, is to continue them as a type for high-speed cars in four-cylinder designs ranging in size from 4 by 6 inches to 4½ by 6 inches, bore and stroke, respectively.

General design and construction of these motors is the same as used the past 2 seasons in the concern's racing cars, with the exception that a double oiling system is now fitted. To do this a double oil pump is fitted in place of the former single type. It is the duty of one of these pumps to send the oil to the bearings and reservoir at the bottom of the motor, keeping the level here constant at all times. The other pump is used for taking away the overflow from the motor and returning this surplus to the main oil tank. It is pointed out that the new system has the advantage of keeping the motor supplied with cool oil at all times and avoids the possibility of overfilling the crankcase with lubricant.

The distinctive features of the Duesenberg design are that the intake and exhaust valves are all horizontally set in the cylinder head and the valves are operated by vertically-positioned rocker arms, one for each valve. The lower ends of these rockers bear on the cams, and the upper directly against the valve rods. With this construction, the valves, as in valve-in-head engines of the usual form, open directly into the cylinder heads without pockets. The valve construction is clearly seen in the end sectional view. A plate goes over the valve rockers and valves, enclosing them effectively against grease and dirt, and silencing them.

Opposite to the valves are plugs in the center of which are the spark plugs. This makes a simple head. The exhaust passages

Duesenberg Motors Are Redesigned

Chief Change Is in Fitting Double Oiling

go directly upward to individual openings, while the passages to the intakes are cored within the cylinder casting, and the carburetor joins to the side to the single opening.

The motor uses a two-bearing crankshaft, special magnalium racing pistons of light construction and having large oil holes in the lower part below the wrist pins. The drive for the camshaft and water pump and magneto is by spiral gears, housed at the front.

The smaller motor—4 by 6—uses the same crankshaft and bearings as the larger size, also has the same valve areas. Therefore, the motor is capable of higher speeds than the larger type. The motors weigh complete 460 pounds when fitted with magnalium pistons and a 70-pound flywheel.

Motors are furnished with rear supports to take the Brown-Lipe or other standard gearsets.

SUES ON BODY CONTRACT

Detroit, Mich., Feb. 4—A default judgment for \$15,000 was rendered by Judge Mandell, in the Wayne county circuit court, in favor of the Griswold Motor and Body Co., of this city, against George H. Partin, Chicago, and Henry E. Graper, of Tennessee, doing business as the Partin Mfg. Co., Lexington, Tenn.

The suit was filed April 28, 1914, on account of breach of contract, Partin and Graper having signed a contract November 21, 1913, with the Griswold company, for 1,000 touring car bodies as a minimum, and a maximum of 2,000 to be taken during the season 1914, these bodies to be known as the Palmer motor car six-passenger body, and to be same as a model now

in possession of the K. C. Knapp Co. The price of these bodies was fixed at \$48 each. December 20, 1913, Partin and Graper suggested several changes in the contract, which was agreed upon by the Griswold company, the changes being in the construction of the bodies, which were to cost \$50 each. It further was agreed, it is said, to cancel 500 bodies and the other 500 were to be delivered half in March and half in April.

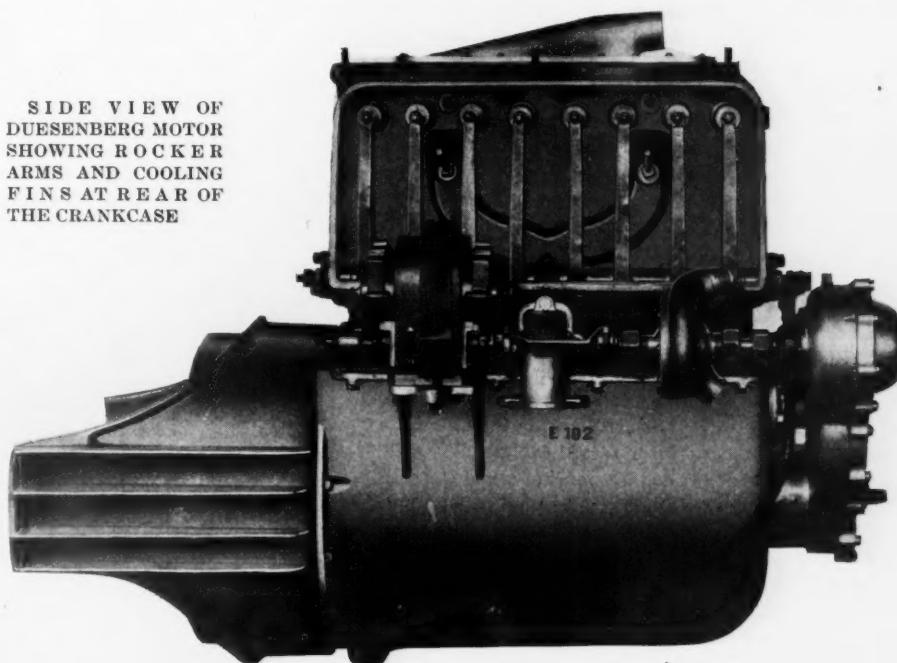
March 6 and April 6 the bodies were ready for delivery but all efforts to reach either Partin or Graper or to communicate with them proved unsuccessful, it is claimed by the Griswold company. The bodies had to be stored and in order to cover themselves the body makers on April 13 had twenty-four cars and 12 chassis seized, all belonging to Partin and Graper and valued at a total of \$17,050.

As the defendants failed to appear in court and as no word was heard from them the circuit judge entered an interlocutory judgment for the plaintiff.

GOOD BUSINESS IN JERSEY TAGS

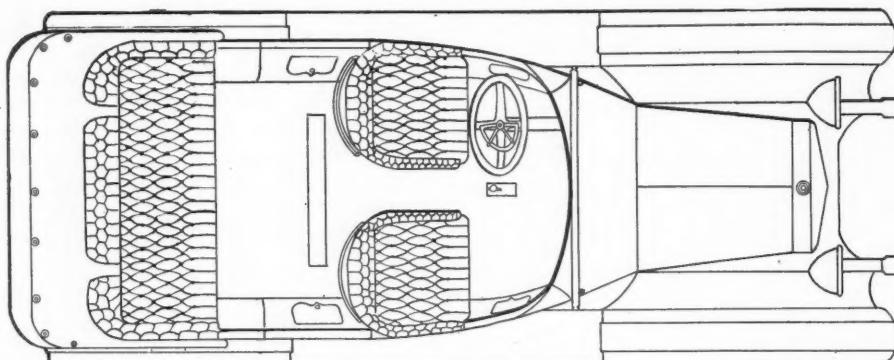
Philadelphia, Pa., Feb. 6—According to the report submitted by State Commissioner of Motor Vehicles Lippincott at Trenton, N. J., today, the fees from motor cars show an increase of 40 per cent for January over the corresponding period of last year. January, 1915, collections totaled \$381,297.09 as against \$259,835.31 last year, a gain of \$121,461.78. The 1915 registration of motor cars for last month was 26,839 compared to 18,645 in January last year, an increase of 8,194, while the licensed drivers totaled 34,494 against 23,

SIDE VIEW OF DUESENBERG MOTOR SHOWING ROCKER ARMS AND COOLING FINS AT REAR OF THE CRANKCASE



Now Comes \$1,000 Eight; Also One with Sleeve Valves

Hollier, Offered at \$985, Sets New Mark



BIRD'S-EYE VIEW OF BAILEY-KLAPP EIGHT, SHOWING DIVIDED FRONT SEATS AND UNIQUE REAR UPHOLSTERY

A N eight-cylinder car to sell at less than \$1,000 is promised. The Lewis Spring & Axle Co., Jackson, Mich., has just announced an eight-cylinder five-passenger car to sell at the record low figure of \$985, equipped. The car is known as the Hollier eight, and special emphasis is placed upon the fact that it is not assembled, but is manufactured complete in the Lewis factory.

Equipped with a 3 by 4½, V-type motor, with the two blocks of four cylinders set at 90 degrees to each other on an aluminum crankcase, the motor, in its general design, adheres to the recognized practice for engines of this class. Suspension is at three points. Specifications of the chassis include a cone clutch of 12-inch nominal diameter, three-speed gearset, combination motor-generator for cranking and lighting, which is attached to the gearbox, floating rear axle with annular bearings, 40-inch cantilever rear springs, 112-inch wheelbase, and 32 by 3½ tires on demountable rims. The equipment is in accordance with present-day requirements.

The Lewis concern has been working on this car for about 8 months, but has kept the fact a profound secret until the present time. Active manufacture and distribution of the Hollier is to begin at once. Deliveries will begin in March and 3,000 cars is the output planned for this year.

LARGER ABBOTT EIGHT PLANNED

Although the Consolidated Car Co., which, as announced, recently took over the manufacture of Abbott-Detroit cars, exhibited at the shows a car equipped with a Perkins eight-cylinder engine of 3½ by 4½ bore and stroke, respectively, and to sell in five-passenger form for \$1,685, the concern has decided not to market this car, but instead is bringing out a somewhat larger eight-cylinder model. This is to be equipped with a Herschell-Spillman eight-cylinder type of 3 inches bore and 5 inches stroke. The new model will be a more up-to-date machine, it is stated by the concern, and equipped with a seven-

passenger body it is to sell for \$2,085. The wheelbase is 121 inches, while the first-designed eight had 116-inch wheelbase. A heavier gearset and drive system is used, and the popular divided front seat feature is to be incorporated in the body construction.

ANNOUNCE AN EIGHT FROM ELWOOD

Eight cylinders is the feature of the new Bailey-Klapp car, just announced by the Elwood Iron Works Co., Elwood, Ind. The price of the car and the complete details of the specifications have not been made public as yet, but it may be stated that the motor is a V-type, 3 by .4 inches in cylinder dimensions. A disk clutch, three-speed gearset and 54-inch rear springs are other features of the chassis.

Upon the 116-inch wheelbase is fitted either a five or seven-passenger body, with one-man top and divided front seats. The manufacturer of the new eight also is making a four-cylinder car called the Elco 30.

ALTER FOUR-CYLINDER FOR 1915

The Alter car which is exhibited the first time this year at the Toledo show and which is made by the Alter Motor Car Co., Plymouth, O., has a four-cylinder Golden, Belknap & Schwartz motor, cast in pairs, with 3¾ inches bore and 4½ inches stroke.

Watercooling is per thermo-syphon system, the lubrication on the splash-pressure system. The Splitdorf ignition system has been adopted. The carburetor is a Holley, the clutch is of the disk-in-oil type. The front axle is a Timken, the rear axle a Walker-Weis semi-floating. The rear springs three-quarter elliptic. The wheelbase is 106 inches, the tread 56 inches.

With stock equipment of one-man top, windshield, horn, speedometer, etc., and with the Remy starting and lighting system the price of either the two-passenger roadster or the five-passenger touring car is \$685. Without this system the price is \$600.

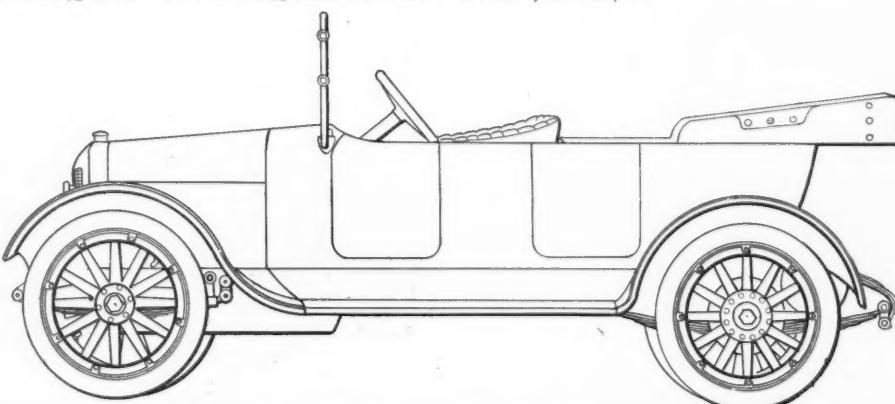
FIRST SLEEVE-VALVE EIGHT

The Pilliod eight-cylinder car which was shown for the first time in public at the opening of the annual Toledo, O., motor car show is designed by C. J. Pilliod, a mechanical engineer known as a designer of internal combustion engines and also as a railroad engineer.

The cylinders are cast in two blocks of fours, at an angle of 90 degrees and have a 3-inch bore and 5-inch stroke. The motor is of the sleeve type and there are no push rods or rocker arms. The bearings are adjustable. The carburetor is a Rayfield, the clutch is of the cone type. Water circulation is of the thermo-syphon type. The lubrication is non-circulating splash. The Atwater Kent ignition system is used. The starting system is the U. S. L. The Warner transmission is being used.

Steering is on the left side with center control. The axles are Timken, floating in rear. Semi-elliptic springs are used both on the front and rear. The wood wheels are fitted with 34 by 4 Congress tires. The frame is overslung in front and underslung in rear. The wheelbase is 120 inches.

For the present only one model will be made, a touring car for 5 or 7 passengers which will be listed at about \$1,800, the price not having as yet been finally decided. The Pilliod Motor Co., which will build the cars is located at 1212 Oakwood avenue, Toledo, O.



BAILEY-KLAPP EIGHT-CYLINDER TOURING CAR

Capacity of Eight-Cylinder Motors in Cubic Inches

Calculated for Bores Between $2\frac{1}{2}$ and 5 Inches, with Strokes from $2\frac{1}{2}$ to $6\frac{1}{2}$ Inches

STROKE—INCHES		BORE—INCHES																				
		$2\frac{1}{2}$	$2\frac{1}{16}$	$2\frac{5}{8}$	$2\frac{11}{16}$	$2\frac{1}{4}$	$2\frac{13}{16}$	$2\frac{7}{8}$	$2\frac{15}{16}$	3	$3\frac{1}{16}$	$3\frac{1}{8}$	$3\frac{3}{16}$	$3\frac{1}{4}$	$3\frac{5}{16}$	$3\frac{3}{8}$	$3\frac{7}{16}$	$3\frac{1}{2}$	$3\frac{9}{16}$	$3\frac{5}{8}$	$3\frac{11}{16}$	$3\frac{1}{4}$
$2\frac{1}{2}$	98.2	103.1	108.2	113.4	118.6	124.2	129.8	135.5														
$2\frac{5}{8}$	103.1	108.3	113.6	119.1	124.7	130.4	136.3	142.3														
$2\frac{1}{4}$	108.0	113.4	119.0	124.8	130.6	136.7	142.8	149.1														
$2\frac{3}{8}$	112.9	118.6	124.5	130.4	136.6	142.9	149.3	155.9														
3	117.8	123.8	129.9	136.1	142.5	149.1	155.8	162.6	169.6	176.8	184.1	191.5	199.1	206.8	214.7	222.7	230.9					
$3\frac{1}{8}$	122.7	128.9	135.3	141.8	148.5	155.3	162.3	169.4	176.7	184.1	191.7	199.5	207.4	215.4	223.8	232.0	240.5					
$3\frac{1}{4}$	127.6	134.1	140.7	147.5	154.4	161.5	168.8	176.2	183.8	191.5	199.4	207.5	215.7	224.0	232.6	241.3	250.1					
$3\frac{3}{8}$	132.5	139.2	146.1	153.1	160.3	167.7	175.3	183.0	190.8	198.9	207.2	215.4	224.0	232.7	241.5	250.6	259.7					
$3\frac{1}{2}$	137.4	144.4	151.5	158.8	166.3	173.9	181.8	189.7	197.9	206.2	214.7	223.4	232.3	241.3	250.5	259.8	269.4	279.1	288.9	299.0	309.2	
$3\frac{5}{8}$	142.3	149.5	156.9	164.5	172.2	180.1	188.2	196.5	205.0	213.6	222.4	231.4	240.6	249.9	259.4	269.1	279.0	289.1	299.3	309.7	320.3	
$3\frac{3}{4}$	147.2	154.7	162.3	170.1	178.2	186.4	194.7	203.3	212.0	221.0	230.1	239.4	248.9	258.5	268.4	278.4	288.6	299.0	309.6	320.4	331.3	
$3\frac{7}{8}$	152.2	159.8	167.7	175.8	184.1	192.6	201.2	210.1	219.1	228.3	237.7	247.4	257.1	267.1	277.3	287.6	298.2	309.0	319.9	331.0	342.3	
4	157.1	165.0	173.2	181.5	190.0	198.8	207.7	216.8	226.2	235.7	245.4	255.3	265.4	275.8	286.3	296.9	307.9	319.0	330.2	341.7	353.4	
$4\frac{1}{8}$	161.9	170.2	178.6	187.2	196.0	205.0	214.2	223.6	233.2	243.1	253.1	263.3	273.7	284.4	295.2	306.2	317.5	328.9	340.5	352.4	364.4	
$4\frac{1}{4}$	166.9	175.3	184.0	192.8	201.9	211.2	220.7	230.4	240.3	250.4	260.8	271.3	282.0	293.0	304.2	315.5	327.1	338.9	350.9	363.1	375.5	
$4\frac{3}{8}$	171.8	180.5	189.4	198.5	207.9	217.4	227.2	237.2	247.4	257.8	268.4	279.3	290.3	301.6	313.1	324.7	338.7	348.9	361.2	373.7	386.5	
$4\frac{1}{2}$	176.7	185.6	194.8	204.2	213.8	223.6	233.7	243.9	254.4	265.2	276.1	287.3	298.6	310.2	322.0	334.0	346.3	358.8	371.5	384.4	397.6	
$4\frac{5}{8}$	181.6	190.8	200.2	209.9	219.7	229.8	240.2	250.7	261.5	272.5	283.8	295.2	306.8	318.8	331.0	343.3	356.0	368.8	381.8	395.1	408.8	
$4\frac{1}{4}$	186.5	195.9	205.6	215.5	225.7	236.1	246.7	257.5	268.8	279.9	291.4	303.2	315.2	327.5	339.9	352.6	365.8	378.8	392.1	405.8	419.7	
$4\frac{7}{8}$	191.4	201.1	211.0	221.2	231.6	242.3	253.2	264.3	275.7	287.3	299.1	311.2	323.5	336.1	348.9	361.9	375.2	388.7	402.5	416.5	430.7	
5	196.3	206.3	216.5	226.8	237.6	248.5	259.7	271.1	282.7	294.6	306.8	319.2	331.8	344.7	357.8	371.1	384.8	398.7	412.8	427.1	441.7	
$5\frac{1}{8}$	201.2	211.4	221.9	232.5	243.5	254.7	266.1	277.8	289.8	302.0	314.4	327.2	340.1	353.3	366.8	380.4	394.4	408.7	423.1	437.8	452.8	
$5\frac{1}{4}$	206.1	216.8	227.3	238.2	249.4	260.9	272.6	284.6	296.9	309.4	322.1	335.1	348.4	361.9	375.7	389.7	404.1	418.6	433.4	448.5	463.8	
$5\frac{3}{8}$	211.1	221.7	232.7	243.9	255.4	267.1	279.1	291.4	303.9	316.7	329.8	343.1	356.7	370.6	384.7	399.0	413.7	428.6	443.7	459.2	474.9	
$5\frac{1}{2}$	215.9	226.9	238.1	249.6	261.3	273.3	285.6	298.2	311.0	324.1	337.5	351.1	365.0	379.2	393.6	408.2	423.3	438.6	454.1	469.9	485.9	
$5\frac{5}{8}$	220.9	232.2	243.5	255.2	267.3	279.5	292.1	304.9	318.1	331.5	345.1	359.1	373.3	387.8	402.6	417.5	432.9	448.5	464.4	480.5	497.0	
$5\frac{1}{4}$	225.8	237.2	248.9	260.9	273.2	285.8	298.6	311.7	325.1	338.8	352.8	367.1	381.8	396.4	411.5	426.8	442.6	458.5	474.7	491.2	508.0	
$5\frac{7}{8}$	230.7	242.4	254.3	266.6	279.1	292.0	305.1	318.5	332.2	346.2	360.5	375.0	389.9	405.0	420.5	436.1	452.2	468.5	485.0	501.9	519.0	
6	235.6	247.5	259.8	272.3	285.1	298.2	311.6	325.3	339.3	353.6	368.1	383.0	398.2	413.6	429.4	445.4	461.8	478.4	495.3	512.6	530.1	
$6\frac{1}{8}$	240.5	252.7	265.2	277.9	291.0	304.4	318.1	332.1	346.3	360.9	375.8	391.0	406.5	422.3	438.4	454.7	471.4	488.4	505.7	523.3	541.1	
$6\frac{1}{4}$	245.4	257.8	270.6	283.6	296.9	310.6	324.6	338.8	353.4	368.3	383.5	399.0	414.8	430.9	447.3	463.9	481.0	498.4	516.0	533.9	552.2	
$6\frac{3}{8}$	250.3	263.0	276.0	289.3	302.9	316.8	331.1	345.6	360.5	375.6	391.1	406.9	423.1	439.5	456.2	473.2	490.7	508.3	526.3	544.6	563.2	
$6\frac{1}{2}$	255.2	268.2	281.4	294.9	308.8	323.0	337.6	352.4	367.5	383.0	398.8	414.9	431.4	448.1	465.2	482.5	500.3	518.3	536.8	555.3	574.3	
STROKE—INCHES		$3\frac{11}{16}$	$3\frac{1}{8}$	$3\frac{13}{16}$	4	$4\frac{1}{16}$	$4\frac{1}{8}$	$4\frac{3}{16}$	$4\frac{1}{4}$	$4\frac{5}{16}$	$4\frac{3}{8}$	$4\frac{7}{16}$	$4\frac{1}{2}$	$4\frac{9}{16}$	$4\frac{5}{8}$	$4\frac{11}{16}$	$4\frac{1}{4}$	$4\frac{13}{16}$	$4\frac{3}{8}$	$4\frac{15}{16}$	5	
		319.6	330.2	340.9																		
$3\frac{1}{2}$	331.0	342.0	353.1																			
$3\frac{3}{8}$	342.5	353.8	365.3																			
$3\frac{7}{8}$	353.9	365.6	377.5																			
4	365.3	377.4	389.6	402.1	414.8	427.8	440.7	453.9	467.4	481.0	494.9											
$4\frac{1}{8}$	376.7	389.1	401.8	414.7	427.7	441.0	454.5	468.1	482.0	496.1	510.3											
$4\frac{1}{4}$	388.1	400.9	414.0	427.2	440.7	454.4	468.2	482.3	496.6	511.1	525.8											
$4\frac{3}{8}$	399.5	412.7	426.2	439.8	453.7	467.7	482.0	496.5	511.2	528.1	541.3											
$4\frac{1}{2}$	411.0	424.5	438.4	452.4	466.6	481.1	495.8	510.7	525.8	541.2	556.7	572.5	588.5	604.8	621.2	637.9	654.8	671.9	689.2	708.8	726.8	
$4\frac{5}{8}$	422.4	436.3	450.5	464.9	479.6	494.4	509.5	524.9	540.4	556.2	572.2	588.4	604.9	621.6	638.5	655.6	673.0	690.6	708.4	728.5		
$4\frac{3}{4}$	433.8	448.1	462.7	477.5	492.5	507.8	523.3	539.0	555.0	571.2	587.7	604.3	621.2	638.4	655.7	673.3	691.2	709.3	727.8	746.1		
$4\frac{7}{8}$	445.2	459.9	474.8	490.1	505.5	521.2	537.1	553.2	569.6	588.												

Electric Lighting, Cranking and Ignition Systems

Standard Types and How They Operate

Part V—Gray & Davis, Ward Leonard, Auto-Lite, North East, Simms-Huff, and Leece-Neville

By Darwin S. Hatch

Editor's Note—This is the fifth and final of a series of articles descriptive of standard types of electric lighting, starting and ignition systems as installed as stock equipment on 1915 cars. The first installment of the series appeared January 7 and covered the theory of the subject in general.

RATHER sweeping redesign of its units characterizes the equipment of Gray & Davis. This redesign was made with a view to producing lighter, more accessible, more compact units and has resulted in a change in form of the units. The characteristic cylindrical shape has given way to a rectangular shape. Most of the equipment is designed, as formerly, for three-unit systems, separate motors and generators being employed. However, there is one generator arranged for distributor drive. This is shown in Fig. 32.

Most important of the changes in the generator is the method of voltage regulation. In the older machines voltage regulation was accomplished by maintaining the speed of the armature constant by the use of a centrifugal governor. In the new machine there is a combined regulator and cutout which rests on the top of the generator and which not only maintains constant voltage regardless of speed variation, but also breaks the circuit when the speed of the generator drops so low that the voltage it generates is less than that of the battery.

Two starting motors and two lighting generators constitute the line for 1915. The most important change is that found in the lighting generators, which are now of the variable speed type.

The two types of lighting generators are the T, rated to give a current output of 10 amperes at 6.5 volts and 1,000 r.p.m. and the S, which gives 10 amperes at 6.5 volts and 650 r.p.m.

The new machines have a frame which is constructed of one flat piece of low-carbon steel formed into a U shape, Fig. 18. This change in frame construction gives greater ruggedness, is more compact, allows more accurate alignment of the bearings and the number of parts is reduced materially. Magnetic leakage also is avoided by this method.

The type T generator is intended for four-cylinder cars and is designed to run at approximately two and one-half times crank-shaft speed or in short, to be driven at its rated speed at a car speed of about 10 miles per hour on high gear.

The type S generator is for six-cylinder machines and is to be driven directly from

the magneto shaft, at one and one-half times crankshaft speed. This gearing allows the generator to run at its rated speed of 650 r.p.m. when the car is driven 10 to 12 miles per hour.

The type T generator complete with regulator cutout weighs 20½ pounds, a reduction of 6½ pounds. It measures 4½ by 5½ by 8½ inches, while the G-1 generator which it replaces measures 5½ by 6 by 11½ inches. Other units have been reduced in proportion.

Mechanical improvements in the motors have been directed chiefly towards accessibility and ease of inspection of parts and to the refinement of details to give greater strength. For accessibility, the new Y motor has the longitudinal type of field yokes which readily permits access to the interior of the motor by the removal of the cover plate from the side. The entire interior mechanism of the motor can be reached by removing these side cover plates.

Electrical improvements in the Y motor, the improved model K, have greatly increased the torque and it weighs only two-thirds as much as the type it supplants. While the type K motor was rated to develop normal load at 3,600 r.p.m. with a current draw of 100 amperes the type Y develops the same torque with the same current consumption at 2,800 r.p.m.

For 1915 the flywheel drive is standard. The speed reducing gears and starting switches are integral with the motor casing and arranged so that a single movement of the starting pedal simultaneously meshes the sliding piston with the flywheel gear and closes the starting switch.

Under normal conditions the draw on the battery varies from 65 to 110 amperes.

In all Gray & Davis systems the starting and lighting machines are separate units, although in the special system recently brought out for Ford cars these two are



FIG. 32—NEW GRAY & DAVIS GENERATOR, WITH ATTACHMENT FOR IGNITOR

mounted one above the other in a single case. Only 6-volt systems are built and the single wire is standard construction.

WARD LEONARD EQUIPMENT

Ward Leonard cranking and lighting equipment chiefly is of the separate-unit type, though the latest production is a motor-generator system for Fords and other special installations. Ignition is to be cared for by other means in these systems.

Four different starting motors are supplied, these differing only in size. All motors are series wound, and are designed to crank the engine at a speed of about 125 revolutions per minute with an average current consumption of 125 amperes at 6 volts. This voltage is standard although 12 volts may be had. Likewise the double-wire system is recommended although the single may be used.

Only one change has been made in the new motors and that was to give slightly increased starting torque, in all other respects the machines are unaltered. The Bendix spiral drive is standard.

A small high-speed generator for small cars with a lamp load of corresponding proportions has been brought out to meet the demand for a unit of this size. It may be driven by chain or belt as desired. In addition a generator for four-cylinder motors, inasmuch as it is designed to be driven at magneto shaft speed, has been brought out. This generator supplies 10 amperes at 400 revolutions per minute. Up to the present, one generator has been used both for four and six-cylinder motors, it being direct-con-

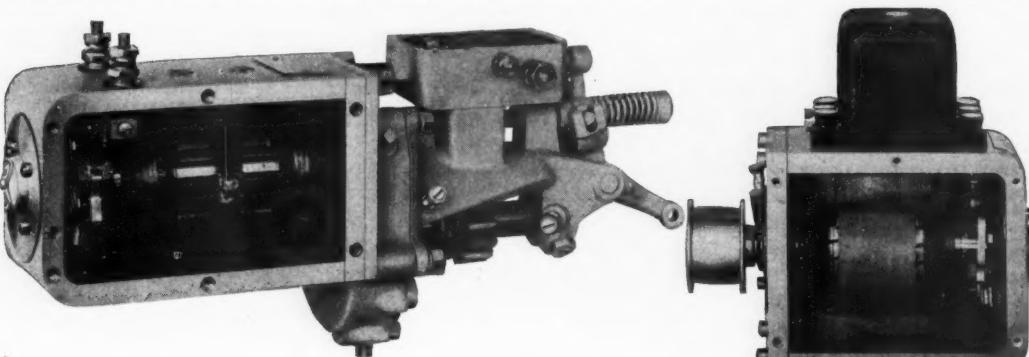


FIG. 31—TWO GRAY & DAVIS UNITS: AT LEFT, CRANKING MOTOR WITH GEARSHIFT; AT RIGHT, INTERIOR OF GENERATOR. THESE ILLUSTRATIONS WERE WRONGLY PRINTED FEBRUARY 4 AS REMY INSTRUMENTS

nected to the magneto shaft on the sixes and geared up on the fours but with the coming of the new model, the 1914 generator will be continued as one for six-cylinder machines exclusively and the new one will be for fours exclusively.

The generators are shunt-wound, regulation being by means of an automatic controller of the vibrating type. The company states that no change has been made in this device since it was brought out 5 years ago.

By means of this device the dynamo will not charge the battery at a greater rate than 10 amperes regardless of the motor speed. This device also acts as a cutout, breaking the circuit when the speed of the generator falls too low to generate voltage equal to that of the battery.

The Ward Leonard company is prepared to furnish starting and lighting specialties to manufacturers of this equipment. These parts include enamelled resistance units for controllers, resistances for headlight, dimming cables, switches and combined controller and cutout. Both starting motors and lighting generators are built with either

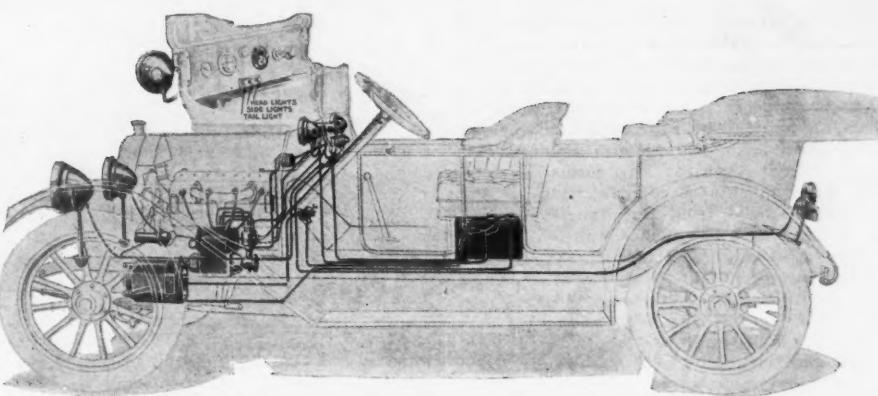


FIG. 35—COMPLETE INSTALLATION OF AUTO-LITE SYSTEM ON CHEVROLET

round or square housing to suit the individual manufacturer. The company makes a specialty of furnishing current controllers to other makers of starting and lighting equipment as well as for other apparatus.

of the name plate band, the brushes and commutator are readily accessible. This motor will crank a six-cylinder engine having 60 pounds per square inch compression pressure at 100 r. p. m., using under 95 amperes. It is so constructed that it can be applied to the car in either a vertical or horizontal position, and can be connected either to the crankshaft through a train of gears or a chain, or to the flywheel direct by having its pinion mesh with the teeth in the periphery. It can also have a transmission application.

Though designed for exactly the same work as model M, the other Auto-Lite motor, model MC, differs in construction and shape, the idea being that if the other motor will not fit the desired position, this one will. It is 7½ inches long by 6¾ inches wide, and weighs 30 pounds. A cast iron frame and field are used, and the series winding is also present. Removal of the name-plates on the end give access to the four brushes. This motor can also be adapted to any desired position. It is said to be capable of driving a 4½ by 5, four-cylinder engine of 60 pounds per sq. in. compression pressure at 185 r.p.m. The usual gear reduction

is about 25 to 1. In the Auto-Lite application, an over-running clutch is interposed in the drive, which disconnects the electric motor when the gasoline motor starts under its own power.

The three Auto-Lite generators are designated as model G, Type SR4; model G, Type VR4; model GC and model GB. The first two are identical except that VR4 has the ignition distributor as a part of it. Model GC is adaptable to the same work as the SR4, but is of a different shape. Model GB has been brought out to meet the needs of the small types of cars.

Type SR4 generator is of the excited field type in which the current output is regulated by a reversed series winding on the field, which serves to cut down the current produced by weakening the field. The generator begins to charge at an engine speed of 200 r.p.m., which corresponds to a car speed of about 5 miles an hour. The output increases until at about 17½ miles an hour the production is 12 amperes. At this point the reversed series winding holds the output no matter how much faster the car travels. The generator operates at engine speed, and can be driven in any convenient manner. It can be placed on a bracket just ahead of the magneto and connected directly to the magneto shaft by a simple coupling, the company points out. It weighs 37½ pounds, and measures 10 by 4¾ inches over all.

The model GC generator is designed to be

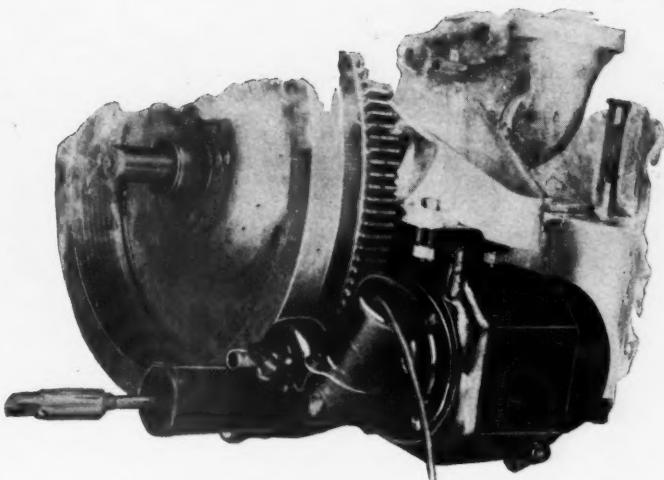


FIG. 34—AUTO-LITE CRANKING MOTOR ON OVERLAND

Chevrolet cars, this being shown in Fig. 35. The model M cranking motor is a series-wound type. It is compact; the length being 8¾ inches, width 5½ inches and the weight 36½ pounds. The entire machine is compactly enclosed in cast iron, which protects all parts from dust and water. By removal

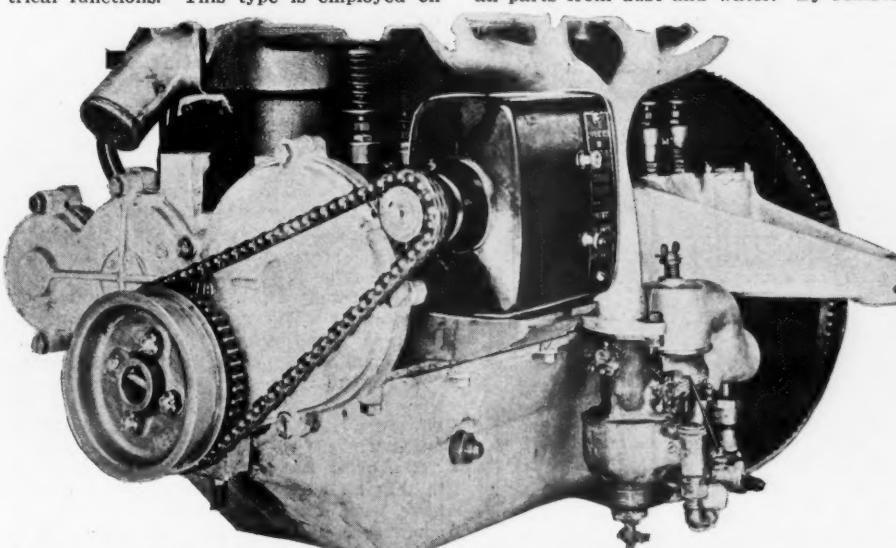


FIG. 33—INSTALLATION OF AUTO-LITE GENERATOR ON OVERLAND

driven by either a chain, train of gears or a V-belt. It runs at $2\frac{1}{2}$ times engine speed, has a maximum output of 14 amperes, and begins to charge at under 7 miles an hour, while 10 amperes is the output at about 12 miles an hour. The current control is the same as that of the generator described above, that is, by a reversed series coil. The machine's compactness may be realized from its dimensions. The length is 8 inches, width 4 inches and height $6\frac{1}{4}$ inches.

With the aim of keeping weight and size to the minimum, the small car generator has been developed with a $6\frac{1}{8}$ inch length and $4\frac{1}{8}$ inch width, and its weight is 13 pounds. It produces 6 amperes at its maximum, and is driven by a silent chain from either the pump, magneto or crankshaft at $2\frac{1}{2}$ times engine speed. It operates efficiently with a 40 ampere-hour storage battery.

NORTH EAST SYSTEM

North East starting and lighting is employed on the Dodge, Imperial and Krit cars. North East products are made in but one model and consist of a motor—of two different voltages—a generator, battery and



FIG. 36—SPECIAL DISCO INSTALLATION ON FORD

switches. However, there are several different methods of installation. For larger cars, the system operates on 24 volts, while on the smaller ones, 12 volts is standard. The Dodge uses the 12-volt system, the motor generator being driven and driving through a chain to a sprocket on the front end of constant current principle, charging being at the rate of about 7 amperes at 12 volts.

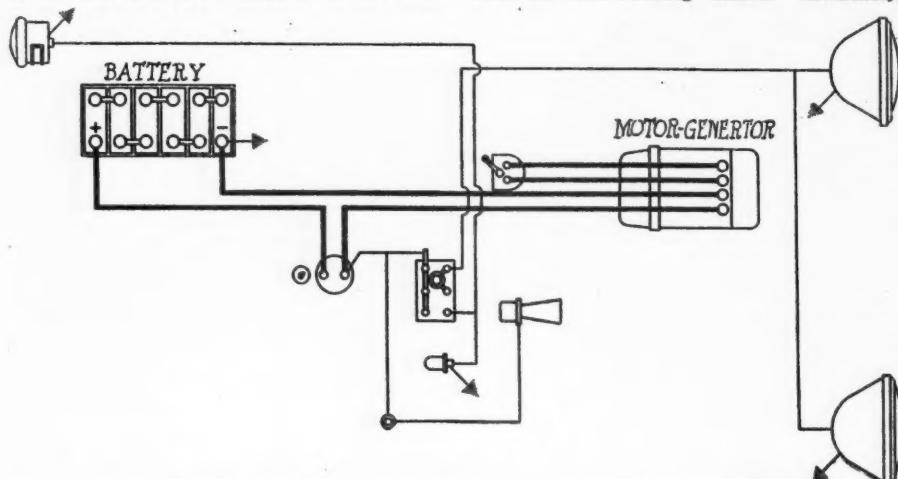


FIG. 37—HOW THE NORTH EAST SYSTEM IS WIRED ON THE DODGE

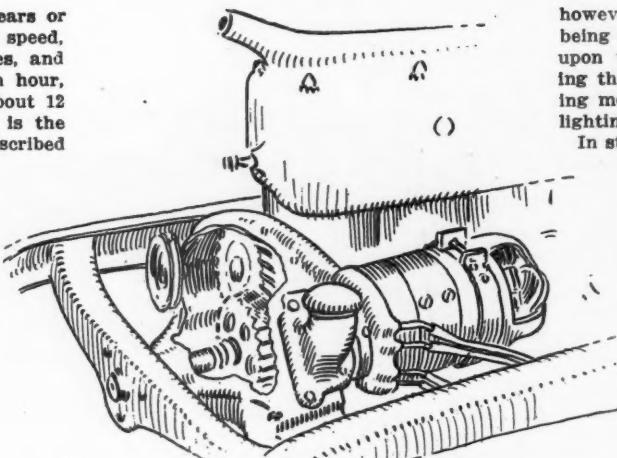


FIG. 38—NORTH EAST AS APPLIED TO DODGE

The voltage regulation is obtained by means of a double field winding with a limiting relay which regulates the field resistance.

Regulation of the current output is on the crankshaft. Fig. 38 illustrates the Dodge installation.

Cranking speed varies from 150 to 200 r.p.m., and the current draw varies between 50 to 60 amperes. Fourteen-volt bulbs are used on both the 12 and 24 volt systems, the headlights being 21 candlepower and the side and tail lights being 4 candlepower. Wiring is very simple, as will be seen from the diagram of the Dodge installation, Fig. 37.

SIMMS-HUFF SYSTEM

A two-unit electric system in which a motor-generator combines the functions of electric lighting and engine starting is being produced by the Simms Magneto Co., East Orange, N. J., under the designation of Simms-Huff and is used on Maxwell cars. The unit has, as features, extreme light weight, hexagonal shape, which facilitates mounting, and an unusual method of disposing the armature windings with a unique type of brush holder which eliminates all but one wire.

The unit is exceptionally compact yet accessibility has in no wise been sacrificed. All of the mechanism which it is necessary to have accessible—the brushes and brush holders—is exposed by the removal of a single light metal casing which slips over the end. The installation may be made in a number of different ways. The unit may be mounted so that the armature shaft is geared for starting through the flywheel with the generator drive by belt, or the starting gear may be by chain or through the timing gears with an over-running clutch. Invariably,

however, the generator drive is by belt, this being one of the features of the system, and upon which reliance is placed for governing the speed of the armature. As a starting motor the unit operates at 12 volts; the lighting circuit operates at 6 volts.

In starting the engine, the motor-generator draws current from a storage battery split into two halves of 6 volts each connected in series. The unit then operates as a cumulative compound motor, there being two field windings, shunt and series.

When the engine is running, the unit automatically becomes a generator, driven by belt, and delivers 10 to 15 amperes to the battery at 6 volts pressure, the halves of the battery being connected in parallel. The regulation of the unit is an inherent feature, the winding being what is styled differential compound. That is, there are two windings which oppose each other so that the terminal voltage and consequently the charging current is not excessive at the higher speeds. At the same time, this winding operates to steady the load upon the engine.

The current output of the generator is regulated entirely by the tension on the



FIG. 39—SIMMS-HUFF BRUSH RING

driving belt. A tight belt will increase the armature speed, thus increasing output and, conversely, a loose belt will decrease speed and output. A relative rate of charging would be from 8 to 15 amperes at 12 to 18 miles an hour car speed. If the ammeter registers less than 8 amperes at 12 miles an hour this indicates that the belt should be slightly tightened, a means for this process being provided in a slotted segment and set bolt on the fan support. It is pointed out that this method of regulation offers advantages in that the charging rate can be changed at will to correspond to winter or summer driving and to the draw upon the battery for lighting.

The starting switch is arranged automatically to make the necessary series connections at the battery for starting and the parallel connection for charging. In addition, there are two terminals which may be used for a battery circuit in the event dual ignition is used.

The cutout, which may be mounted on the dash, is of the usual reverse current relay type. This automatically connects generator and battery when the charging current builds up to the proper strength and breaks the connection when the engine speed drops off, with a consequent drop in charging current.

The brush holding mechanism is unusual in that all wires with the exception of one have been eliminated. This has been accomplished by connecting each set of three brushes to a metallic ring, one of which is a permanent ground and the other, which is

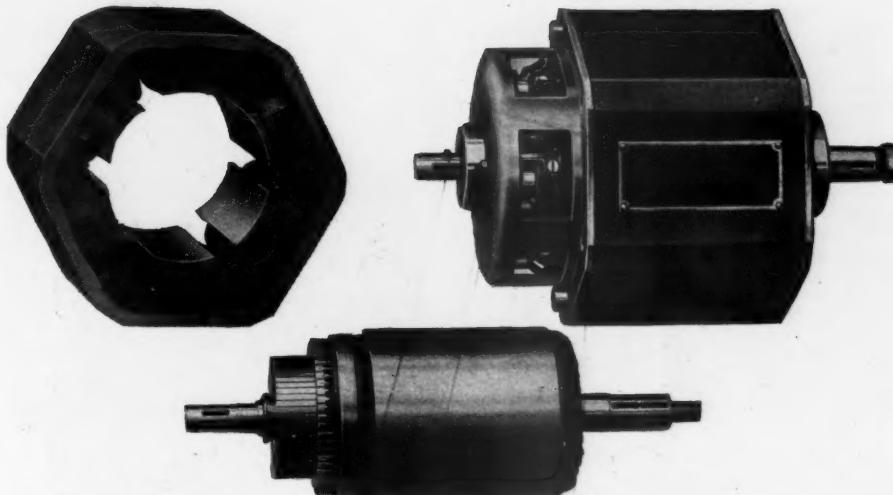


FIG. 40—ARMATURE, FIELDS AND COMPLETE SIMMS-HUFF UNIT AS APPLIED TO MAXWELL

the single wire connection, going to the field winding. Thus, six wires have been done away with.

The winding of the armature is another feature that is different from usual practice. Though the armature is of the drum-wound type, the winding is passed through circular holes punched in the core laminations. The result is that the wires are thoroughly protected and cannot be thrown out by centrifugal force in the event that the starting gear should stick and cause the armature to be rotated at excessive speed, and additional surface is exposed to the action of the field. A reverse current cutout is provided.

LEECE-NEVILLE SYSTEM

Leece-Neville electric starting and lighting system as used on the Haynes 1915 six is a two-unit type. It consists of an electric motor for cranking the engine and a separate electric generator which furnishes current to charge the storage battery and for lighting, ignition, horn, etc. The ignition, a timer and distributor, is built into the generator and is driven by a worm gear on the armature shaft. The generator is directly connected to the engine by means of gears and is electrically connected to the battery through an indicating circuit breaker, and operates as follows:

When the engine starts the generator at once commences action and at an armature speed of 350 R. P. M. its voltage is sufficient to close the electromagnetic cut-out in the circuit to the battery and the latter is then being charged. The voltage of the generator is controlled by reaction so that the maximum current—15 amperes at $7\frac{1}{2}$ volts—is reached at approximately 15 miles per hour of the car on high gear. At higher speeds the reaction of the generator holds the voltage constant at $7\frac{1}{2}$ volts, but with a slightly reduced amperage. The generator continues to charge the battery until the car speed falls below 5 miles per hour, when the cut-out will open and break the circuit, thus protecting the battery from being discharged back through the generator when the car stops.

The motor is mechanically connected to the crankshaft of the engine by means of a roller chain running on an overrunning clutch, which engages only when the starting switch is operated. It is connected to the storage battery through a starting switch, operated by pressure of the foot. Upon pressure being applied to this switch the circuit is closed and the motor is energized and cranks the engine. When the engine starts an over-running clutch disengages automatically, and the engine runs free, ahead of the motor, and upon releasing

the switch pedal the electrical circuit to the motor is broken.

The Leece-Neville cut-out breaks both sides of the circuit to the battery. It has

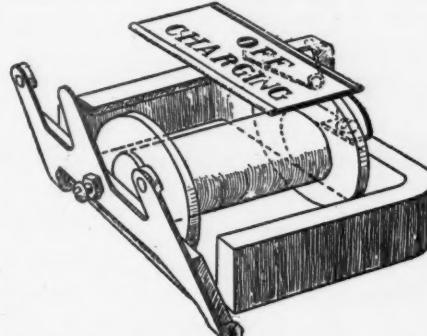


FIG. 41—LEECE-NEVILLE INDICATING RELAY

six current-carrying contacts on each one of the sides.

An unusual fixture of this system is the indicating target which shows whether the generator is charging or not. As shown in Fig. 41 it is simply an electromagnet assisted by a permanent magnet with the lettered

target attached to the armature. By this arrangement, the target is thrown up or down, depending upon whether or not current is flowing in the electromagnet.

FRENCH CENSOR MOTOR PRESS

Paris, Feb. 6—Military censorship in Europe applies not only to the daily press but to the special press concerned only with technical subjects. Thus, L'Auto, the only French motor journal which has been able to continue publication during the war, has been suspended for 8 days by order of the military authorities. It is declared that this step has been taken because the army authorities disapproved of an article which previously had been passed by the censor. L'Auto has submitted to the penalty without comment.

TO STANDARDIZE AMBULANCES

London, Feb. 6—A commission has been formed here to investigate ambulance designs and to report on a standard form for government specification. This commission will act as a judging committee for the award of \$10,000 in prizes, provided by the Wellcome bureau of scientific research for the best design for an ambulance to fit all standard motor chassis for field service. The competition closes June 30, 1915. The first prize is \$5,000; the second, \$2,500, and the third, \$1,500. The competition is open to citizens of all nations, and all contributions must be made to the ambulance construction commission, 10 Henrietta street, Cavendish square, London, Eng. The conditions are as follows:

1—The body must carry, in comfort and safety, four wounded lying on stretchers of British army regulation pattern, or eight wounded sitting, or two lying and four sitting, in addition to the driver and orderly attendant.

2—The patients must be sheltered from weather and sun, with due regard to ventilation.

3—The vehicle must be capable of being loaded from the ground level by four or fewer bearers.

4—Every patient must be accessible for attendance from one side without being shifted from his position.

5—There must be a vertical space of not less

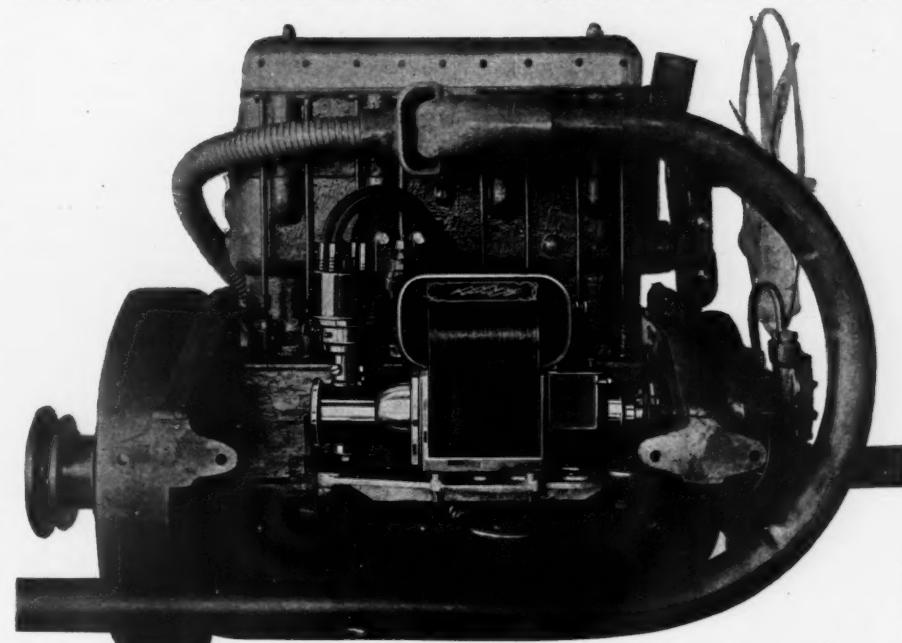


FIG. 42—AUTO-LITE GENERATOR-IGNITOR AS FITTED TO CHEVROLET

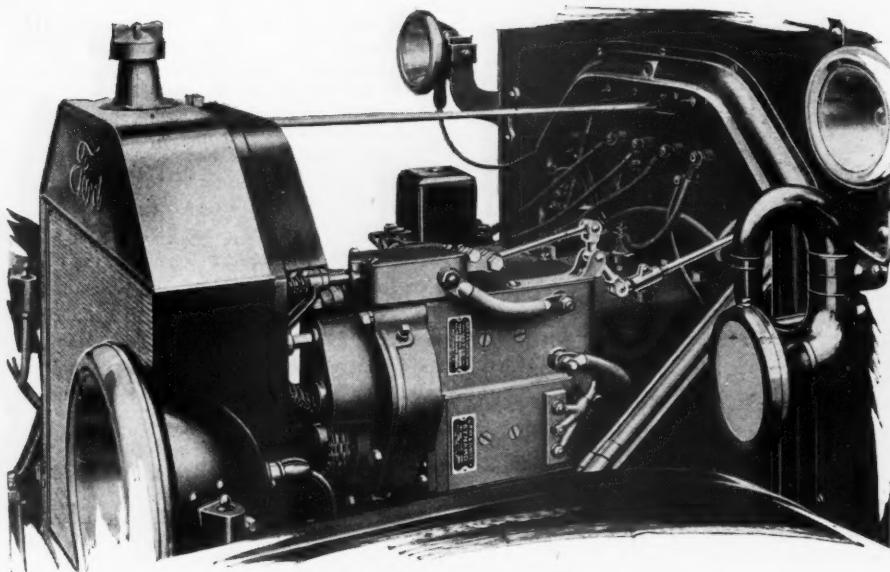


FIG. 43—GRAY & DAVIS SPECIAL FORD EQUIPMENT



FIG. 44—FISHER SPECIAL FORD EQUIPMENT

than 2 feet between the lower and upper tiers of patients.

6—There must be sufficient windows to insure ample light by day and means of lighting the interior by night.

7—There must be means for the orderly, on the box or elsewhere, to see every patient during running.

8—There must be means of carrying the arms and equipment of the patient, some dressings,

water and small quantities of hot liquid in the vehicle.

9—A vertical line through the center of gravity of the body must fall between the axles, whether the body is laden or empty. The center of gravity must be kept as low as possible.

10—The body must be kept as light as possible compatible with adequate strength.

11—The materials of construction should be

as noninflammable as practicable. Competitors may be called upon to submit samples of materials of construction.

12—The body must be of such a design that it will fit a chassis, the essential dimensions of which are shown in a drawing, which may be had upon application.

13—In making the award the cost of construction of the body will be taken into consideration.

Electric Cranking and Lighting Systems Applied As Stock Equipment to 1915 Cars

Car and Model	Starter	Bat. cap.	Bat. volt.	Starter volt.	Lamp volts	Car and Model	Starter	Bat. cap.	Bat. volt.	Starter volt.	Lamp volts
Abbott-Detroit	Auto-Lite	120	6	6	6	Inter-State		80	6	6	6
Alien, 34.	Westinghouse	80	6	6	6	Jackson	Auto-Lite	120	6	6	6
Alten, 4-27.	Spittdorf-Apelco	35	12	6	6	Jeffery, 104.	Bijur	100	6	6	6-4
Apperson	Bijur					Jeffery, Four.	U. S. L.	100	6-12	12	7
Arbenz	Wells	120	6	6	6	Jeffery, Six.	U. S. L.	12-24	12	6-4	
Argo						Jeffery, 106.	U. S. L.	24	12	6-4	
Auburn, 6-47.		120	6	..	..	King	Ward Leonard.	80	6	10	
Auburn, 6-40.		80	6	..	7	Kisselkar, 6-60 & 6-40.	Esterline	120	6	6	6
Auburn, 4-36.		80	6	..	7	Kisselkar, 4-36	Westinghouse	100	6	6	6
Austin	Westinghouse	120	6	6	6	Klinckar.	Westinghouse	120	6	6	6
Bauer	Emerson	100	6	6	6	Krit.	North East.	35	12	12	12
Briscoe	Spittdorf-Apelco	35	12	12	6	Lambert.	Griggs	75	6	6	6
Buick	Delco	80	6	6	6	Lexington.	Jesco	100	6	6	6
Cadillac	Delco	130	6	6	7	Locomobile.	Westinghouse	120	6	7	6
Cartercar.	Delco	100	6	6	7	Luverne.	Jones	100	6	6	6
Case, 25.	Westinghouse	80	6	6	6	Lyons-Knight.	North East.	50	24	..	7
Case, 35.	Westinghouse	100	6	6	6	Marion.	Gray & Davis.	50	12	12	12
Case, 40.	Westinghouse	120	6	6	6	Marmont.	Bosch	50	12	12	6
Chadwick	Westinghouse	100	6	6	6	Maxwell.	Simms-Huff	35	6	12	6
Chalmers, 26B and Master Six.	Dyneto	50	21	21	21	McFarlan.	Westinghouse	120	6	6	6
Chalmers, New Six.	Gray & Davis.					Mercer.	U. S. L.	35	12	..	..
Chandler.	Gray & Davis.	80	6	6	6	Meteor.	Spittdorf-Apelco	35	12	12	6
Chevrolet.	Auto-Lite	80	6	6	6	Moline-Knight.	Wagner	60	12	12	6
Cole, 440.	Delco	100	6	6	6	Moon.	Delco	120	..	..	7
Cole, 650.	Delco	120	6	6	6	Monarch.	Robbins & Myers.	80	6	6	6
Corbitt, F & E.	Jones	100	6	..	..	National.	Remy	100	6	6	6
Crawford, 6-35.	Westinghouse	100	6	6	6	Oakland.	Delco	105	6	7	7
Crow-Elkhart, E-52—E-55.	Ward Leonard.	80	6	81	38	Oldsmobile, 55.	Delco	120	6-1/2	6-1/2	6
Crow-Elkhart, E-42 & E-45.	Remy	80	6	80	38	Oldsmobile, 42.	Delco	60	6	6	6-1/2
Cunningham, S.		120	6	6	6	Overland.	Overland	80	6	6	6
Davis, 38 A and B.	Westinghouse	80	6	6	6	Packard.	Bijur	120	6	6	6
Davis, 6-50.	Gray & Davis.	80	6	6	6	Pathfinder.	Willard	120	6	6	6
Detroit, C.	Westinghouse	100	6	6	6	Partin-Palmer.	Gray & Davis.	80	6	6	6
Dile.	Dyneto	80	6	..	6	Pateron, 6-48.	Pateron, 6-48.	120	6	6	6
Dodge.	North East.	40	12	6	12	Pateron, 4-32.	Peerless, 6-55.	120	6	6	7
Dorris, 1A 4.	Westinghouse	100	6	6	7	Peerless, 6-55.	Gray & Davis.	80	6	6	7
Empire.	Remy	50	12	12	14	Pierce-Arrow.	Westinghouse	100	6	6	6
Enger.	Gray & Davis.	80	6	6	6	Pratt.	Gray & Davis.	80-120	6	6	6
Flat.	Bosch-Rushmore	120	6	6	6	R-C-H.	Ward Leonard.	100	6	..	6
Firestone-Columbus.	Gray & Davis.	10	6	6	6	Regal.	Bosch-Rushmore	80	6	6	6
Franklin, 6-30 M.	Dyneto	60	12	12	14 & 7	Remington.	Gray & Davis.	..	..	..	..
F. R. P.	Bosch	50	12	12	12	Ross.	Delco	120	6	6	6
Glide, 30.	Westinghouse	80	6	6	6	Scripps-Booth.	Bijur	..	..	..	..
Great Western, B.	Bosch-Rushmore	80	5	6	..	Simplex.	Bosch-Rushmore	120	6	6	6
Great Western, 4.	Gray & Davis.	80	6	6	6	Singer.	Westinghouse	100	6	6	6
Halladay.	Westinghouse					Spaulding.	Dyneto	50	18	18	18
Haynes, 30.	Leece-Neville	112	6	6	6	Sphinx.	Spittdorf-Apelco	35	12	12	6
Haynes, 31 & 32.	Leece-Neville	60	12	12	6	Stearns, Light 4.	Gray & Davis.	80	6	6	6
Herff-Brooks.	Spittdorf-Apelco	80	6	6	6	Stearns, Big 4 & 6.	Gray & Davis.	120	6	6	6
Herreshoff.		80	6	6	6	Stevens-Duryea.	Delco	100	6	..	6
Hudson, 6-40.	Delco	80	6-7	6	7	Stutz, H. C. S.	Remy	120	7	7	7
Hudson, 6-54.	Delco	120	6-7	7	7	Stutz, Bearcat.	Westinghouse	120	6	7	7
Hupmobile, H.	Westinghouse	100	6	6	12-14	Touraine.	Gray & Davis.	150	6	6	6
Imperial, 56.	North East.	80	8	..	6	Trumbull.	..	60	6	6	6
Imperial, 64.	Gray & Davis.	80	6	..	..	Velle.	Gray & Davis.	80	6	6	6
						Winton.	Gray & D. & Bijur	..	..	..	..

The Motor Car Repair Shop

A PREVALENT trouble in cars which have been in service for several years is the misalignment of the front wheels. This gives rise to great tire wear, to say nothing of the trouble it gives the driver in steering. Either the wheels do not line, due to a bend in the axle, or more probably due to the steering crossrod being out of adjustment. It may be too long, so that the wheels toe in, or it may have become bent, so that it pulls the spindles somewhat closer together back of the axle and causes the planes of the wheels to diverge at the front, with the result that they toe out.

The bending of this rod is more likely to happen than the lengthening of the rod due to the turn buckle at the end getting loose. In Fig. 1 is shown a typical type of steering crossrod connecting between the wheel spindles, so that both move properly when the steering reach rod is pushed or pulled by the steering gear. That the wheels will be parallel, this rod must be of the correct length. Measure the distance from one wheel rim to the other at the front and then directly back of the axle in the same horizontal line. The two distances should be the same if the wheels are properly set. To correct any fault here, loosen the nut N, Fig. 1, and turn the buckle M one way or the other, depending upon whether the rod is to be shortened or lengthened. Having moved the buckle the proper distance, tighten nut N again, and it should remain set. Obviously, if the wheels are too close together in front of the axle, and too far apart at the rear, then the crossrod should be shortened and vice versa.

Taking up Play in Reach Rod

Between the steering arm, with its ball end at the bottom of the steering gear, and the double steering arm, which is a part of one of the wheel spindles, there is a reach rod, which serves to control the movement of the front wheels in accordance with the movement of the steering wheel by the driver.

The bottom illustration in Fig. 1 shows in section one of the latest forms of reach rod with spring buffered bearings for the ball ends of the two arms to which it connects. These springs serve to take any road shocks and prevent their being transmitted to the driver through the wheel. The springs also serve to prevent the connections from becoming loose and rattling.

Although the reach rod is not liable to rattle when the car is comparatively new, nevertheless it is a source of noise in old cars, and often the driver, though anxious to locate the unpleasant rattle, fails to recognize the source.

To take up any play in the type shown the threaded plugs A and B can be screwed inwardly by means of the slotted ends,

Caring for the Steering Parts

which take a large screwdriver or other similar tool. The cotter pin C serves to prevent the plug from coming loose.

To pack these joints with grease, which is an operation that should be done once in 6 months, these plug ends can be unscrewed and the whole properly lubricated. Some rods are fitted with grease cups at these ball joints so that the lubrication is accomplished just as spring bolts are lubricated. In cases where there are no cups of this kind it is an excellent idea to place small leather boots, specially made for the purpose, over the joint so as to keep in the grease and keep out foreign matter such as dust and grit. If these little boots cannot be obtained from a supply dealer, they can easily be made from soft leather. Even chamois can be utilized to make excellent covers of this kind. A stiff cloth also will serve to hold in the grease if any of the other materials are not available.

Waterproofing the Magneto

Although many of the leading makes of magnetos are today so constructed as to be

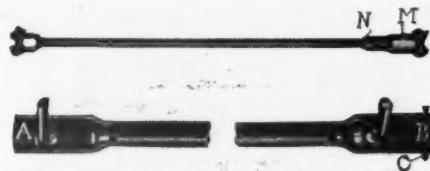


Fig. 1—In correcting faults in distance between front wheels the link above is adjusted by loosening the nut N and turning the buckle M one way or the other, depending upon whether the rod is to be lengthened or shortened. The adjustment of the steering drag link or reach rod is given in the text

waterproof, there are many in use in comparatively recent cars which are by no means impervious to the splashes of water or mud that will get to them. Not every splash of this kind will have a damaging effect, but occasionally one hits a vital spot and temporarily puts a contact out of commission. Cases are known to the writer where drops of water got between the horseshoe magnets and prevented the machine from functioning, stopping the car, much to the annoyance and bewilderment of the driver. A strip of paper was finally slipped between the magnets in the very thin air space, this being done largely by guesswork, for it was not supposed that this was the trouble. After drying the magnets in this way the machine worked properly.

To prevent any such troubles, not only from water but from oil and grease as well, there is nothing better than a leather cover to slip over the entire machine. Some supply dealers carry such covers, but one

can be made easily by a shoemaker or harness goods concern. The small expense is forgotten when the security from mishaps in wet weather is considered. It is not very pleasant to have your car stall on a very rainy day, due to water having splashed onto the magneto and put it out of business for the time being—at least until you have clambered out into the mud and rain and dried it off, and taken the trouble to clean the distributor contacts, and so on.

An Unusual Fire

A bad fire and possible destroying completely of a certain make or car occurred when the ignition wires, which were rubber insulated, dropped down onto the exhaust manifold. The heat of the iron casting set fire to the rubber insulation, and a merry blaze was discovered under the hood when the driver chanced to see it flickering through the pedal openings in the floor boards. The carburetor was close at hand and the fuel tank not far away in the cowl. Quick action with some dirt from the road served to put out the blaze before it had reached the gasoline, but it was a close call. The cause of the trouble was that the ignition wires were not properly supported above the exhaust in the first place, and their stiffness was largely depended upon to prevent them from falling down onto the hot surface. The driver's carelessness was largely responsible for the poor support of the wires, for a bracket had originally been used to hold them up. This had worked loose and fallen off.

After a car has been in continuous service for several years there is a certain amount of wear in the spring bolts, for the action of the springs is a constant one. This wear results in an annoying rattle specially noticeable on rough places. It is often removed by wrapping thin sheets of metal around the bolts and then replacing them in their mountings in spring and bracket. The best way, and by far the safest, is simply to discard a worn set of spring bolts and replace them by new ones.

Using Old Oil

When the crankcase is drained the old oil after being thoroughly strained may be used in the gearset during the cold weather. The gears at this time require a thin oil and that from the motor should prove to be equally as satisfactory for use for a short time, as a grease.

Preventing Skidding

Much of the side slipping on slippery pavements may be attributed to unevenly adjusted brakes. When the brake on one side holds tightly while the opposite one does not there is a tendency for the car to move sideways. The brakes should be adjusted so that both rear wheel bands grip even and then there will be not so much danger in skidding.

Accessory Offerings

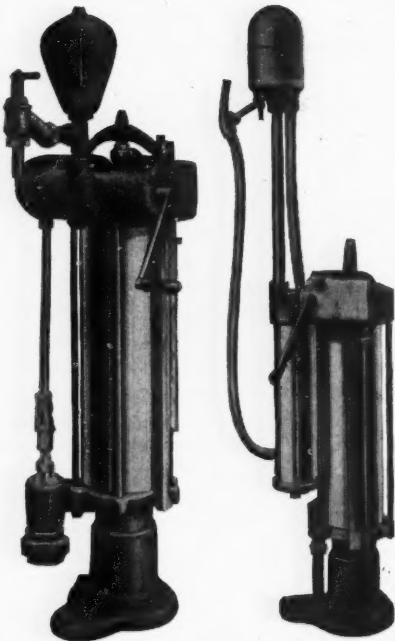


Fig. 1—Two new Bowser pumps, that at the left being the model 105 and that at the right the model 101. The former is of 5-gallon capacity and is designed for inside use. The 101 is a 5-gallon quick-return pump

New Bowser Pumps

FIVE new types of garage and sidewalk pumps have just been announced by S. F. Bowser & Co., Fort Wayne, Ind., four of these being for inside use and one for outside. The new models are known as the 101, 102, 103, 105 and 106.

The 101 is a 5-gallon, quick return pump, finished in red enamel with nickel trimmings, for use only with gasoline. It is furnished standard with the filter, hose and portable nozzle tip and hose draining attachment.

The 102 is for outside use only. It is a $\frac{1}{2}$ -gallon, self-measuring pump, equipped complete with lamp post and globe, 8 feet of $1\frac{1}{4}$ -inch hose with portable nozzle tip, filter, meter, discharge register and two locks, one on the pump and one on the casing.

The 103 is a 1-gallon self-measuring pump for inside use, furnished with filter, red enamel finish with nickel trimmings. It is for use in handling gasoline. Hose and portable nozzle can be furnished on this pump when ordered.

The 105 is a 5-gallon pump for inside use, finished in black enamel with nickel trimmings. It is practically the same as the 101, except that on this pump the filter is omitted, the finish is black instead of red, and the pump cannot be used for gasoline and other volatiles.

The 106 is a 1-gallon self-measuring pump for inside use, and is practically the same as 103, except that on this pump

the filter is omitted, the finish is black instead of red, and the pump cannot be used for gasoline and other volatile liquids.

Yost Carbon Remover

The J. L. Yost Mfg. Co., San Francisco, Cal., is marketing a carbon remover which is in the form of pellets. When four of these are dropped into a carbonized cylinder and the motor started, the carbon is said to blow out with the exhaust. Price 60 cents per box of forty-eight pellets.

Topping Air Pump

A two-cylinder air-cooled compressor, designed for garage use, is being manufactured by Topping Bros., 122 Chambers St., New York. It is an all-metal design of 2 by 2 bore and stroke and fitted with cylinder flanges to assist cooling. The recommended speed is 250 to 300 r.p.m. The height is 12 inches, length $6\frac{1}{2}$ and width 6 inches. The price is \$50 and it is shown in Fig. 5.

B & B Portable Cylinder Grinder

A portable cylinder grinder, driven by a $\frac{1}{10}$ horsepower motor is announced by Boxill & Bruel, Cincinnati, O. The chief claim for this garage and repairshop in-

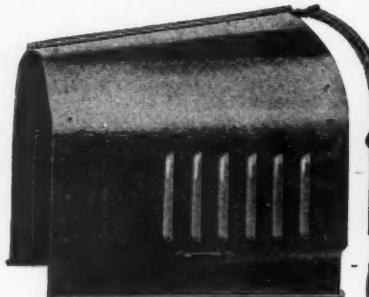


Fig. 2—Superior-Ford hood which is said to improve the appearance of the car because of its gradual slope from radiator to dash. The price is \$11.40, and it is fitted with gills, as shown

stallation, is that it does the work of the larger grinders at about $\frac{1}{6}$ the cost. It is an automatic type, fitted with a sensitive adjustments means, whereby it can be made to cut out any amount of metal within its limits. As shown in the illustration in Fig. 3 the cutting bar is vertical and it is driven by means of worm gears from either a $\frac{1}{10}$ -horsepower horizontal motor or a $\frac{1}{6}$ -horsepower vertical. Inside the vertical bar, which is shown inside the cylinder in the illustration, is a sleeve which contains the grinding spindle. The sleeve being eccentric to the main bar makes it possible to bore different-size cylinders.

Da-Lite Inspection Lamp

A new type of trouble or inspection lamp is announced by the L. P. Halladay Co., Streator, Ill. This lamp uses an ordinary dry cell which is placed into the container shown in Fig. 7, the top of the con-

tainer being fitted with a reflector and bulb which is fed by the dry cell. A suitable handle is provided and within easy reach of the thumb is a control switch. It will be noted no parts are exposed. The price is \$1.50 in japan finish and without battery, \$2 in nickel or brass finish.

Superior Ford Hood

In order to improve the appearance of the Ford car, the Superior Lamp Mfg. Co., 136 West 52nd street, New York, has brought out what it calls a streamline hood. The new hood tapers slightly from the radiator to the dash as shown in Fig. 2. The material is pressed 16-gauge steel. As the illustration shows there are six gills on each side. The finish is black enamel and the price \$11.40 ready to attach.

Over-Turn Ford Starter

The Overholt Co., Galesburg, Ill., is marketing a new type of spring starter for Ford cars. This device depends for its action upon the unwinding of a spring which imparts the stored energy to the motor which rewinds the spring as soon as firing begins. It takes 20 revolutions of the engine to bring the spring into readiness for another cranking operation. The Over-Turn is mounted in front of the radiator, as shown in Fig. 6. It weighs about 45 pounds and sells for \$45.

Perfect Handle Screwdrivers

Two unusual types of screwdrivers are marketed by H. D. Smith & Co., Plantsville, Conn., one of them being for use on screws in out-of-the-way places. To make

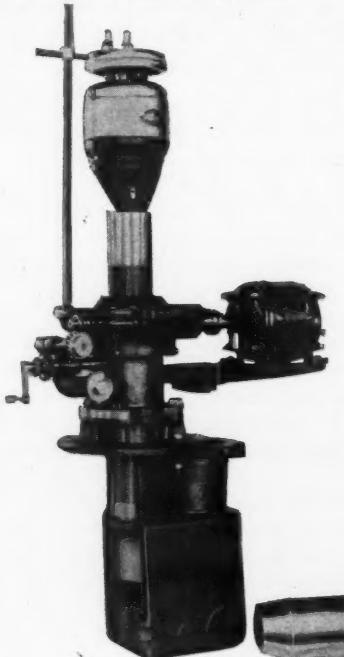


Fig. 3—B & B portable cylinder grinder, which is said to do work which compares favorably with that done by large grinding machines. It is adjustable for different-size cylinders and for various cuts

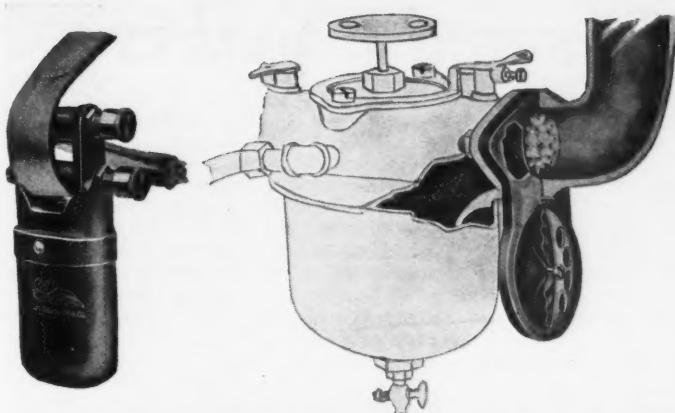


Fig. 4—The left illustration is that of the new C-C shock absorber for heavy cars. It has three springs, one inside the other, the outer one being rather stiff to take the heavy shocks. The right illustration is that of the Summers' Carbon-Eater, which feeds additional air to the motor

the work easy the main bit of the device has two smaller bits placed at right angles to it. The smaller ones run in opposite directions, so that no matter in what direction the screw head is set the device may be used effectively. Another type being made has an adjustable handle so that the leverage may be changed to suit the operator. Price of the first mentioned type is 50 cents.

King Oilless Bearing

J. F. King, Milwaukee, Wis., has just perfected what is called an oilless roller bearing which instead of having the rollers rub against metal and separated by a film of oil, uses a film of air. This air film is said to keep the friction surfaces separated and cool so that wear is reduced. Its application to motor cars necessitates, of course, some form of pump for supplying the bearings with air. The maker states that in various tests both in the shop and on the road good results were obtained. The bearing is now being tested in railway cars.

New C-C Shock Absorber

The Cox Brass Mfg. Co., Albany, N. Y., has just announced a new type of C-C shock absorber which is designed for use on heavy cars and can be attached easily to any type except the Ford car, for which a special device is made. The new C-C sells for \$10 per pair and it makes use of



Fig. 5—Topping garage air compressor, which has a bore and stroke of 2 by 2 and sells for \$50

the small one is an auxiliary to assist the others. A nut at the bottom of the C-C allows of making spring adjustment.

Summers' Carbon-Eater

What is claimed to be a carbon-preventer has been brought out by the Summers Motor Devices Co., 705 E. 35th street, Kansas City, Mo., under the name of Carbon-Eater. The device is claimed to prevent carbon deposits by improving the mixture by means of additional air and so making it a better explosive, with little carbon deposited after firing. The device

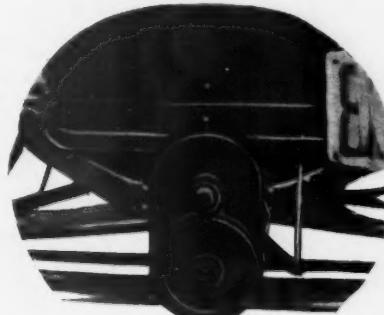


Fig. 6—Over-Turn starter for Ford cars, which depends for its action upon the energy stored in a wound-up spring. It is easily installed and sells for \$45

is in the form of an air valve with eight holes as shown in Fig. 4. The air rushing through these holes first forms a film which separates the incoming gas from the manifold and later it mixes with the fuel to form a more combustible mixture. The price is \$5.

Wondermist Polish

A polish for motor car bodies is marketed by the Wonder Mist Co., 162 N. Dearborn street, Chicago, and sold at 25 cents per $\frac{1}{2}$ -pint can. Besides polishing the body the Wonder Mist, which is in liquid form, is said to remove dust and dirt, thus allowing the polish to do its work more effectively. It is sprayed over the surface with a special sprayer and then wiped with clean cheese cloth.

New O. G. Shock Absorber

The Oxygen Generator Co., Inc., 301 River street, Troy, N. Y., has brought

three helical springs, one inside the other, and the unit mounted in a dustproof and waterproof housing, as shown in Fig. 4. The largest spring is rather stiff and it is designed to take the heavier shocks, while the smallest one is quite limber and takes up the vibration. The middle spring between the large stiff one and the



Fig. 7—Da-Lite inspection lamp, which uses an ordinary dry cell. There are no exposed parts and the control button is operated easily with the thumb

out a new O. G. shock absorber. Its main feature is the adjusting cap, which makes it adjustable to Ford delivery, touring cars and runabouts. It has an extra large amount of spring action and is double acting, absorbing not only shocks but rebounds also, it is claimed. The O. G. shock absorber is offered for \$5.00 per set. The price is \$9.80 per set of four and when installed the absorber is at any angle.

Standard-Ford Shock Absorber

A new Ford shock absorber has been added to the already-large field, the latest device being the Standard, made by the Standard Devices Co., Pittsburgh, Pa. This is a spring type, in which the helical spring is housed in a steel shell or cylinder, the latter being attached to the axle. The price is \$9.80 per set of four.

Error in Casing Price

In the January 28 issue of Motor Age on page 31 the prices of the Day sectional casing were mis-stated. Those given were from \$18.75 for the 30 by $3\frac{1}{2}$ size to \$25.50 for the 37 by 4. The correct price range is from \$10 for the 30 by $3\frac{1}{2}$ to \$17.25 for the 37 by 4.

Sentinel Pyrometers

A new method for measuring temperatures has just been developed by the Carl Nehl Alloy Co., Detroit, Mich. This consists of different kinds of metallic salts which are made into mixtures that will melt at different temperatures throughout the range between 220 and 1,330 degrees centigrade. Practical means have been devised for using them in place of the more costly pyrometers. They are also useful for checking pyrometers. When a cylinder is placed at the end of the thermocouple and when it melts, the pyrometer should read the same as the temperature marked on the Sentinel.

New Water Bucket

The Whitall Tatum Co., 46 Barclay street, New York city, has brought out a water bucket which is made of red rubber, cloth lined. It holds 15 gallons and is reinforced to stand heavy strains by means of double corners, and strong handles which will not pull out. The price is \$1.25.

Multibestos Brake Lining

The Standard Woven Fabric Co., Framingham, Mass., is the manufacturer of Multibestos, a well known brake lining which is adaptable for use on motor vehicles of all kinds using either internal or external brakes. It also is used on clutches.



Among the Makers and Dealers



MARSHALL Marion Company Treasurer—Tom L. Marshall has been elected treasurer of the Marion Motor Co., Indianapolis, Ind.

Magnus Co. Starts—The Magnus Co. of Detroit, has been organized to take over the business of the National Fulton Brass Mfg. Co., and will continue the brass casting and foundry business of that concern. The capital stock of the new concern is \$100,000 and about 150 men are employed.

Seidel Piloting the Pilot—T. H. Hill, who has been treasurer and general manager of the Pilot Motor Car Co. for some time has resigned and his place will be taken by George E. Seidel, president of the Pilot company. Mr. Seidel also is president of the Seidel Buggy Co. He will devote his entire time to the management of the Pilot company.

Wheel Company Election—At the annual meeting of the stockholders of the American Metal Wheel Co. of Toledo, Henry Streetman was elected president; F. H. Steel, vice-president; John C. McKisson, secretary-treasurer; Clarence W. Bennett, general manager. These officers and Ira C. Taber, J. C. Anderson and Joseph Roth, form the board of directors.

Marketing New Headlight Dimmer—H. B. Wittkoski, general manager of the Kent Electric Co., Grand Rapids, Mich., has invented and patented an electrically operated dimmer which is being marketed under the name of Kent headlight dimmer. The new device is connected directly to the steering column and the control button is operated in combination with the push button of the horn.

Hawkeyes Elect—The Tri-City Auto Dealers' Association at Davenport, Ia., has elected the following officers for the ensuing year: President, G. F. Burmeister; vice-president, P. C. Petersen; secretary-treasurer, Ross Beede. The board of directors named for the ensuing year includes Elbert Don of Rock Island, G. F. Burmeister, Ross Beede and P. C. Peterson of Davenport and A. J. Ostlund of Moline.

New General Manager for Olds—At a salesman's convention, held last week by the Olds Motor Works, W. J. Drumpelmann, who was central district manager of the Lozier Motor Co., was appointed general district manager of the Olds, with headquarters at the factory and E. A. Hart, D. E. Ford and F. A. Gross, formerly factory representatives, were promoted respectively to central southwestern and southern district managers.

Detroit Pressed Steel Co. Election—At the annual meeting of the stockholders of the Detroit Pressed Steel Co., the following officers were elected: Hobard D. Hoyt, president; Carl H. L. Flinterman, vice-president and general manager; Edward E. Caulkins, secretary-treasurer. These officers and R. F. Flinterman, DeWitt H. Taylor, Kirby A. White and J. Walter Drake, make up the board of directors.

Henderson Matter in Court—The Michigan Motor Car Parts Co. has filed suit in the federal court at Indianapolis asking that Joseph M. Smith be enjoined from selling parts of the Henderson motor car. Smith was receiver for the Henderson company. In his answer to the complaint, Smith says the Michigan company did not buy the exclusive rights to sell Henderson parts, but that the right rests in the several manufacturers of the parts. He also says the Mich-

igan company has no right to use the name "Henderson Motor Car Co." or "Henderson car" as the names were not copyrighted and were not sold by the receiver.

Edison to Build Benzol Plant—Thomas A. Edison will erect a by-product plant to extract benzol from coking coal at the plant of the Cambria Steel Co.

Second Receiver Named—Judge Dillon has appointed John W. Kaiser a co-receiver with F. C. Myers for the United States Carriage Co. of Columbus, manufacturer of motor-driven hearses.

Business Thriving—The annual sales convention of the Detroit Steel Products Co. took place in Detroit this week. Officials of the company announce that during 1914 the business of the concern had increased 33 per cent over the preceding year.

New Device on Market—The Cooper Mfg. Co. has just been formed at Worcester, Mass., to put on the market a new device called the Lightning trouble finder and jump spark tester invented by J. C. Cooper. The company has opened salesrooms.

Marketing Four New Accessories—Clarence N. Peacock & Co., New York, sales agent for the Ames shock absorber, has secured the eastern distribution of the following accessories: Standard springs, S-M-H chain tool, Clincher tire plow and Boyce hand horn.

Grant Leases New Plant—The Grant Motor Co. Findlay, O., has leased the plant formerly occupied by the Findlay Table Mfg. Co., and will be used to finish its cars, the chassis being built in the original plant, or plant number 1. This additional plant increased the floor space of the Grant company

by 40,000 square feet and will enable the building of thirty-five to forty cars daily, or nearly double the output facilities last year.

Chandler Adding to Plant—The Chandler Motor Car Co. has started the construction of an addition to its plant on East One Hundred and Thirty-first street, Cleveland. An addition was erected about a year ago and now another is necessary.

Stewart-Warner Declares Dividend—The Stewart-Warner Speedometer Corp., Chicago, has declared the regularly quarterly dividend of 1½ per cent on its common stock and 1¼ per cent on its preferred stock, both payable February 1 to holders of record January 23.

Electric Men to Meet—Plans have been made for a 2-day convention of electric car and truck manufacturers, agents and battery and lighting station officials during the Boston show. The first session will open on March 10 and headquarters will be established at the Boston City Club. Invitations have been sent to all companies identified with the electric vehicle interests and the officials of all the branches of the Electric Vehicle Association of America.

New Body Building Concern—The building of metal bodies has been started at Worcester, Mass., by George Demers & Son, long in the blacksmith, carriage building and motor car repairing business at 98 Union street. The company has secured N. Allard, for 14 years one of the expert body builders at the Knox factory at Springfield, Mass., and later with the Springfield Metal Body Co., to take charge of the work. Special machinery has been ordered and the company will go into the business on a large scale.

New Fender Company—The Interstate Automatic Safety Fender Co. has been organized with a capital of \$10,000 for the purpose of manufacturing and selling fenders for motor trucks, under the patents held by the Automatic Safety Fender Co. of Chicago. It is planned to open a factory in Columbus and to cover the states of Ohio, West Virginia, and Kentucky. Offices have been opened in room 74 Ruggery building. J. V. Morgan is president; J. B. Moore, vice-president; E. J. Kinnison, secretary and Peter Napier, treasurer.

To Make Hub Trucks—The Hub Motor Truck Co. of Columbus, O., has been incorporated with a capital of \$300,000 to manufacture and sell motor cars. It is planned by the organizers to open a factory in Columbus for the manufacture of the Hub motor trucks, basic patents for which are held by the Hub Motor Truck Co. of America a New York corporation. The incorporators of the Columbus company are T. C. Haney, John L. Herpich, John B. Baas, R. Wilke and John J. Chester. A truck is now being built at the Kaiser Motor Car Co.

Gramm Trucks Off to Front—The first consignment of motor trucks shipped from Lima, O., for use in the European war left the Gramm factory recently, consigned to New York. The order for these trucks was received in November and the Willys-Overland Co. of Toledo booked it. That was before the reorganization of the Gramm Motor Truck Co. under the Geiger-Jones Co. of Canton. The trucks are of the ½-ton type and will be included in an order of 3 and 4-ton trucks made at the Toledo and Elyria factories. All will be tested in New York before being shipped to the war zone. The Gramm trucks will be used in the distribu-

Coming Motor Events

SHOWS AND CONVENTIONS

February 6-13—Show, Hartford, Conn.
 February 8-13—Show, Salem, Mass.
 February 8-13—Show, Wilmington, Del.
 February 8-13—Show, Toledo, O.
 February 8-11—Show, Peoria, Ill.
 February 8-15—Show, Kansas City, Mo.
 February 9-12—Show, Eau Claire, Wis.
 February 10-13—Show, Davenport, Ia.
 February 15-20—Show, Omaha, Neb.
 February 15-20—Show, Grand Rapids, Mich.
 February 15-20—Show, Tacoma, Wash.
 February 15-20—Show, Fort Wayne, Ind.
 February 16-18—Show, Bloomington, Ill.
 February 18-20—Show, Racine, Wis.
 February 22-27—Show, Duluth, Minn.
 February 23-27—Show, Ft. Dodge, Ia.
 February 23-27—Show, Syracuse, N. Y.
 February 24-27—Show, Freeport, Ill.
 February 24-27—Show, Battle Creek, Mich.
 February—Show, Rockford, Ill.
 March—Show, Shelbyville, Ind.
 March 6-13—Show, Boston, Mass.
 March 8-13—Show, Des Moines, Ia.
 March 13-20—Show, Harrisburg, Pa.

CONTESTS

* February 22—Vanderbilt cup race, San Francisco, Cal.
 * February 27—Grand prize road race, San Francisco, Cal.
 March 17—Road race, Venice, Cal.
 * May 29—500-mile speedway race, Indianapolis, Ind.
 * June 9—200-mile race, Galesburg, Ill.
 * June 19—Chicago speedway race.
 June 25—300-mile race, Sioux City, Ia.
 * July 4-5—Speedway races, Tacoma, Wash.
 August 20-21—Elgin road races.
 * Sanctioned by A. A. A.

tion of supplies, while the heavier trucks will be used to transport equipment. The order from the Gramm plant was twenty-five trucks.

Changes at Muncie Gear Works—J. R. Goetcheus, general manager of the Muncie Gear Works has severed his connection with that concern having accepted a position as general manager of the Muncie Oil Engine Co. Frank H. Jones, engineer for the Muncie Gear Work also has resigned and is organizing a sales force for the distribution of the Chandler for eastern Indiana with headquarters at Muncie.

Grant Holds Election—The following officers were elected for the current year at the annual meeting of the stockholders of the Grant Motor Co. of Findlay, O.: David A. Shaw, president; George D. Grant and George S. Salzman, vice-presidents; George S. Walte, secretary and sales manager. The board of directors consists of these officers and E. A. Dorsey, J. M. Howe, Roger R. Hall and Charles A. Grant.

Adams Company on Its Feet—At the annual meeting of the stockholders of the Adams Brothers Co. Findlay, O., Dr. N. L. MacLachlan was elected president; Murray Irwin, vice-president and general manager; G. M. Carter, secretary; B. B. Bigelow, treasurer. These officers and E. C. Edwards, W. F. Hosler, W. A. Hollington and J. G.

Addison, N. Y.—Chatfield Garage; incorporators, Festus H. Wheaton, Charles H. Owens and Alfred B. Chatfield.

Akron, Ohio—Akron Motor Lock Co., to manufacture locks for motors; incorporators, M. M. Smith, J. H. Dugan, J. S. Hill, G. M. Hill and J. F. Miller.

Albany, N. Y.—Automatic Lace & Embroidery Co.; incorporators, Jos. S. Lesser, Myron L. Lesser and Morris Kobacker.

Albany, N. Y.—Broadway Auto Body Co., vehicle accessories; incorporators, E. Grebert, J. Liez and K. Borjath.

Albany, N. Y.—Economical Tire & Supply Co.; directors, George Rauchfuss, Thomas F. MacMahon, Anna T. Heimberg.

Albany, N. Y.—Garford Motor Truck Co.; incorporators, Minnie Miller, Ellen Kilburn and Emma E. Wills.

Albany, N. Y.—Cedro & Engs, handle motor cars, also garage and storage; incorporators, G. F. Gates, W. Hoey, R. L. Engs.

Albany, N. Y.—Ever-Ready Tire & Rubber Co.; incorporators, Willard J. Woodlock and Albert W. Warwalk.

Albany, N. Y.—Midgeley Tire Sales Co., to sell products of Midgeley Tire & Rubbers Co.; incorporators, W. C. Wilson, E. T. Wilson and G. H. Wilson.

Albany, N. Y.—Taylore Corp., manufacture motor cars and motors; incorporators, Roy E. Taylore, Harry A. Moss, Julius Cowen.

Albany, N. Y.—United Auto Trunk Co.; incorporators, David Diamond and Louise Weissman.

Appleton, Wis.—Appleton Ford Co., dealers in motor cars; incorporators, W. C. Hull, R. A. Schwartzberg and J. L. Tolleson.

Beloit, Wis.—Rex Gasometer Co., to manufacture measuring devices for gasoline tanks, etc.; incorporators, W. H. Corcoran, R. H. Goodwin and E. R. Young.

Boston, Mass.—Winegrat Motor Top & Body Co.; incorporators, Brant Winegrat, Nicholas Isaacson and S. Hurwitz.

Brooklyn, N. Y.—Everready Tire & Rubber Co., manufacturers of tires; incorporators, Willard J. Woodcock, Frank W. Woodcock and Albert W. Norwalk.

Brooklyn, N. Y.—Hart Waterproof Mfg. Co., waterproof and rubberized auto goods; incorporators, James H. Hart, James F. Hart, Edw. E. Berry.

Brooklyn, N. Y.—Incas Automobile Co.; incorporators, John H. Eckhoff, Chas. H. Jacob and Malcolm McPhail.

Brooklyn, N. Y.—Normal Tire Repair & Supply Co., tire shop; incorporators, Percy Hind, William Hind and William H. Preston.

Brooklyn, N. Y.—Pitkin Motor Co.; incorporators, Louis Levin, Ida Levin and Thomas Conlew.

Brooklyn, N. Y.—S. & K. Oil & Gasoline Co.; incorporators, Nathaniel H. Kramer, Sam Schenkel, Louis J. Kaufman.

Canton, Ohio—Globe Motor Car Co., to deal in motor cars, trunks, etc.; incorporators, C. S. Lochemer, E. M. Raber, G. A. Marks, J. W. Rover and J. R. Bodine.

Chicago, Ill.—Vial Motor Co., motor cars and vehicles; incorporators, J. D. Kendall, Edward H. Hartigan and Frank S. Righelmer.

Cleveland, Ohio—Adams-Oakland Co., to deal in motor car trucks and accessories; incorporated; H. M. Adams, A. A. Sterns, J. C. Royon, John A. Chamberlain and L. A. Krauss.

Columbus, Ohio—Hub Motor Truck Co.; incorporators, T. C. Hanly, John L. Herpich, John B. Bass, R. Wilke, John J. Chester.

Danbury, Conn.—Mathewson Taxi Co.; incorporators, Edwin E. Mathewson, Nellie E. Mathewson and Selina Seaman.

Kwiss were elected directors. F. E. Liddle, formerly of Jackson, Mich., has been appointed factory superintendent. Although this company was released from the receiver's hands only recently, the officers have reported that the business outlook of the company is very bright.

Findelsen Sales Manager—Findelsen & Kropf of Chicago, manufacturers of the Rayfield carburetor, announce the appointment of C. W. Findelsen as general sales manager. Walter Findelsen, as the new sales manager is generally known, is the son of the president of the company. For the last 4 years he has been in active charge of the factory sales and stepped naturally from there into full charge of all sales.

"Route European Shipments Here," Boston Asks—As a result of a shipment of sixteen carloads of motor cars from Boston on a steamer for Europe last week, the Boston chamber of commerce has been asked to appoint a committee to visit the factories in the middle west to get them to route their cargoes for the other side through Boston because of its fine railroad facilities direct from the big plants.

Shipping a Cadillac South—Manager Albion L. Danforth of the Boston Cadillac agency had his troubles last week when he began plans to ship to South America an eight-cylinder car ordered by Frederic J. Stimpson,

newly appointed ambassador to the Argentine Republic. The car had to go by way of London, and Mr. Danforth was forced to get United States government seals from Secretary of State William J. Bryan to paste on the crate. On all four sides of the crate a reproduction of the American flag has been pasted together with other indications that it is the property of an American official and so not subject to seizure.

Has Track on Roof—The new Ford building in Montreal is unique in this respect that on the roof of the building is a big concrete track which can be utilized for demonstrating purposes.

Allen Takes Over Engine Company—The Allen Motor Co. of Fostoria, O., manufacturer of the Allen car, has taken over the business of the Sommers Motor Co., in Bucyrus, O., which has been making the motors used in the Allen cars.

Locates at Chelsea, Mich.—The Wagner Resilient Wheel and Tire Co., which was organized in Chicago last year under the laws of the state of Michigan, with a capital stock of \$500,000, has purchased the plant formerly occupied by the National Peat Fuel Co. at Chelsea, Mich., and will start manufacturing within a short time. The officers of the company are William F. Wagner, president; T. E. Russell, vice-president; A. C. Baird, secretary-treasurer.

Recent Incorporations

Defiance, Ohio—Elliott-Markey Co., dealers in motor cars and accessories; incorporators, G. W. Elliott, J. C. Markey, H. L. Elliott, R. E. Markey and B. J. Emery.

Detroit, Mich.—Bell Pump & Mfg. Co., to make tire pumps; incorporators, Bradley W. Bue, Horace L. Norton and Mattie E. Oakley.

Detroit, Mich.—Detroit Tapering Radiator Co.; incorporators, Joseph A. Moross, Maud S. Moross, Benjamin C. Loring and Rosanna C. Loring.

Detroit, Mich.—Schneider Electric Co.; incorporators, George Schneider, Louis Fets, Jr., Abram L. Coom.

Detroit, Mich.—Wolverine Bus Co., to operate a jitney line; incorporators, Maurice M. Wolf, Eli Cohen and Florence Wolf.

Indianapolis, Ind.—Auto Body Co.; incorporators, H. Putnam Wood, J. E. Wood, Roy M. Stuart.

Indianapolis, Ind.—I. J. Cooper Rubber Co., to deal in tires; incorporators, I. J. Cooper, A. D. Stocker, H. H. Brenner.

Jackson, Mich.—Commonwealth Motor Co., to manufacture motor car accessories, etc.; incorporators, Earl J. McKain, Clayton R. Plunkett and W. H. Jamieson.

Lawrence, Mass.—Bradford Garage; directors and officers, R. S. Chase, Jos. E. Paris, W. H. Moison.

Milwaukee, Wis.—Magnus Co., to manufacture metal products; incorporators, Charles H. Duback, William F. Libay and John Jackson.

New Glarus, Wis.—New Glarus Automobile Co., to deal in motor cars; incorporators, Nick K. Zweifel, Henry M. Steussy and N. H. Steussy.

New York—Arrow Garage, Inc.; incorporators, Geo. A. Muir, Albert Teets and Jos. K. Savage.

New York City—Broadway Auto Body Co.; incorporators, K. Dorjath, John Liez and E. Grebert.

New York (Bronx)—Bronx Motor Car Co.; incorporators, Wm. F. Wahrenburer, Edw. VanKueren and Mary Van Kueren.

New York—Club Cab Corp., motor car renting business; incorporators, Aksel Witzfeld, Geo. B. Read and Robert Strabe.

New York—Cram Taxicab Co.; incorporators, Geo. E. Cram, Lizzie Cram and Chas. E. Wilson.

New York—Lobell-Aborn Auto Co.; incorporators, Maurice B. Lobell, Jacob Aborn and Morris Jawitz.

New York City—Monarch Auto Supply Co.; incorporators, Louis Levene, Max Richman and Leopold Phillip.

New York—Motors by the Hour Rent Co.; incorporators, James S. Garvan, Daniel S. Sprague, John G. MacDonald.

New York—Peoil Aeroplane Corp.; incorporators, H. Schleifer Sayers, William L. Sayers and John K. M. Ewing.

New York—Cigilia & Pelletier Correct Carburetor Co., to make devices for motor cars,

etc.; incorporators, Louis F. Pelletier, Ernest F. Cigilia and A. T. Henderson.

New York—Primer and Mixture Regulator Co., devices for cars; incorporators, Edward A. McCoy, Arthur J. Wells and Frederick Richardson.

New York—Seventy-fourth St. Garage Co.; incorporators, William Korn, Joseph L. B. Mayer and Bernhard Mayer.

New York—Story & Reed, Inc., to deal in motor car tubes, tires, etc.; incorporators, Elmer G. Story, Ernest G. Story and Eaton V. Reed.

New York—W. A. Trock Motor Co.; incorporators, Walter A. Trock, Mary Trock and Chas. A. Hitchcock.

New York—United Auto Trunk Co.; incorporators, David Diamond, Philip Diamond and Louis Weltzman.

New York—W. N. White, Son & Co., to deal in motor cars, coal, machinery, lumber, etc.; incorporators, W. N. White, W. S. Fogel, and W. Polvott.

North Attleboro, Mass.—American Safety Appliance Co., maker of appliances for motor cars; directors and officers, J. H. Swallow, Ernest T. Green and J. J. Cleary.

Portland, Me.—Hood Starter Co.; officers, Albert F. Jones, T. L. Croteau, and James E. Manter.

Richmond, Va.—Schulter Auto Repair Co., a general motor car business; incorporators, Harry T. Moore, Guy B. Gillard.

Rochester, N. Y.—Chapin-Owen Co., to make sporting goods, tires, etc.; incorporators, Charles S. Owen, Charles T. Chapin and Charles H. Chapin.

Springfield, Ill.—Central Garage, motor cars and garage business; incorporators, L. B. Stever, L. Klee and E. S. Schurr.

Springfield, Ill.—The Hunter Auto & Supply Co., manufacture and deal in motor cars and accessories; incorporators, W. A. Bither, R. H. Farrell, and C. R. F. Bither.

Springfield, Ill.—National Service Corp., motor cars and accessories; incorporators, C. B. Bishop, C. J. Jacobs, H. W. Davis.

Springfield, Mo.—Southwest Motor and Supply Co.; incorporators, H. F. Fellows, F. J. Curran and H. B. McDaniels.

Stapleton, N. Y.—Clifton Auto and Storage Co.; incorporators, Walter L. Scott, Frederick Scott and J. Winfield Scott.

Syracuse, N. Y.—Cronin Garage Co.; incorporators, Clarence E. Brown, Jas. Crinnin and Edward L. Moore.

Toledo, Ohio—The Duccess Rubber Co., to make rubber articles; incorporated, Clarence B. Keemer, John M. McCabe, Walter G. Kirkbride and H. B. McCabe.

Trenton, N. J.—Estes Airless Tire Co., manufacture tires, rubber goods, etc.; incorporators, M. F. Ometta, B. C. Rithwell and M. J. C. Walter.

Trenton, N. J.—Tenafly Service Co., to deal in motor cars; incorporators, Robert D. Connors, Garrett Z. Dennarest, Walter Midler.

Waterbury, Conn.—Field & Feydt, Inc.; incorporators, Robert C. Field, Herman G. Feydt and A. H. Dayton.

Wilmington, Del.—Federal Motor & Mfg. Co., makers and dealers in motor vehicles, etc.; incorporators, R. B. Owen, W. F. A. Buchner and B. Buchner.

Wilmington, Del.—Biddle Motor Car Co., to manufacture motor vehicles, etc.; incorporators, C. B. Bishop, G. C. Jacobs, H. W. Davis.

Yonkers, N. Y.—Powers Rubber and Supply Co., dealer in tires and rubber goods; incorporators, Martin C. Powers, Lena M. Powers and Warren A. Schenck.



Brief Business Announcements



FINDLAY, O.—J. J. Carson has disposed of a part of his garage at Bowling Green to Ben and Roy Gander.

Cincinnati, O.—A branch office will be opened in the Union Central building by the Polack Tire and Rubber Co., of New York.

Chicago.—The Chicago branch of the Dayton Rubber Mfg. Co. of Dayton, Ohio, has moved to larger and better quarters at 2011 Michigan avenue. W. E. Anderson is now district manager with his headquarters at 2011 Michigan avenue.

Indianapolis, Ind.—A new type of piston rings known as the K. and M. Conform is now being made by the Modern Electric Motor and Machine Co., and marketed by the Superior Auto Parts Co. L. J. Eby is sales manager of the concern.

Detroit, Mich.—The Cotta Transmission Co., Rockford, Ill., manufacturer of transmissions, has appointed K. W. Nadler a consulting engineer, as the Detroit representative. He will have his offices in the Chamber of Commerce building.

Chicago.—G. V. Nelson, former advertising manager and second vice-president of the Auto Parts Co., Chicago, will organize a new company along the same lines in Kansas City, to be known as the K. C. Auto Parts Co., of which he will be president and general manager. This new concern will occupy

a two-story and basement building at 1827 McGee street. The opening day will be about February 23.

San Francisco, Cal.—Hughson & Merton, have been appointed coast distributors for Gray & Davis.

Pontiac, Mich.—L. T. Vaughan, formerly in charge of the repair and service department of the Oakland Motor Car Co., has opened a garage and repair shop in the Osmun & Graley building.

Mansfield, O.—The Cadillac has been organized here with George Herring as manager to act as agent for the Cadillac in this territory. The sales rooms are located on West Park avenue.

Marshfield, Wis.—Hugo Wegener, who has represented the Kisselkar here for some time, has established a salesroom and garage and taken on the Grant agency. Frank Zettler has been appointed manager.

Indianapolis, Ind.—The Sphinx Motor Sales Co., has been formed by Harry Hill, and D. B. Carter to handle the Sphinx cars in the state of Indiana. Show rooms have been opened at 516 North Capitol avenue.

Algoma, Wis.—E. A. Klatt, senior member of the firm of Klatt & Rider, conducting a garage and agency, has disposed of his interest to William A. Nesemann, and the firm name has been changed to Rider &

Nesemann Automobile Co. The concern will be incorporated soon. It represents the Ford.

Eugene, Ore.—W. H. Fenton and E. W. Fenton have taken over the Buick garage in this city.

Detroit, Mich.—Electrical specialties are to be built by R. C. Neighbors, formerly sales manager of the Hupp Motor Car Co. His headquarters will be at 100 Beaubien street.

Manawa, Wis.—Carl M. Nelson of Waupaca, Wis., has purchased the garage and business of the Manawa Garage Co. and takes immediate possession. Mr. Nelson has been in charge of the machinery department of the A. M. Hansen Co., Waupaca, for 9 years.

San Francisco, Cal.—The Latham Davis Co. has succeeded the E. Stewart Auto Co. as local distributor of the Fiat cars. In addition to this line it also will act as distributor of the Stutz and Pullman cars. J. Paulding Edwards, a local capitalist, is now president of the organization.

Appleton, Wis.—The Appleton Ford Co. has been organized at Appleton, Wis., by J. F. Tolleson, W. C. Hull and Theodore T. Stark of Appleton and R. A. Schwartzburg of Milwaukee to become representative for the Ford in the vast Fox River valley territory. The garage and salesrooms will be located in the farm machinery and imple-

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make	Town	Agent	Make
Argonia, Kas.	Achelphohl & Bringer	Case	Chester, N. Y.	Murray's Garage	Oldsmobile
Amityville, N. Y.	Amity Garage	Case	Chrisholm, Minn.	Oscar Pohjonen	Oldsmobile
Altamont, Ill.	Frank Schlotterbeck	Case	Cincinnati, O.	Cochran & Co.	Koehler
Almira, Wash.	J. M. Johnson	Reo	Coalinga, Cal.	Martin's Garage	Oldsmobile
Athens, O.	F. E. Goldsberry	Koehler	Cornville, Me.	George Hovey	Dodge
Algoma, Wis.	Rider & Neseman	Ford	Cleveland, Ohio	Hamilton M. Car Co.	Chevrolet
Allentown, Pa.	I. N. Miller	Detroiter	Cleveland, Ohio	Cartercar Sales Co.	Cartercar
Atlanta, Ga.	W. J. Dabney Co.	Maxwell	Cleveland, Ohio	Weaver-Brownlee Co.	Pierce-Arrow
Atlanta, Ga.	W. J. Dabney Co.	Maxwell	Cleveland, Ohio	National Garage Co.	Krebs
Atlanta, Ga.	W. J. Dabney Co.	Paige-Detroit	Columbus, O.	Miller-Main Garage	Koehler Trucks
Atlanta, Ga.	W. J. Dabney Co.	Paige-Detroit	Columbus, O.	Hub Motor Truck Co.	Trucks
Athens, Me.	George Hovey	Dodge	Columbus, O.	Westcott Motor Sales Co.	Westcott
Anna, Ill.	R. Tuthill	Oldsmobile	Colfax, Wash.	G. B. Carter & Son	Case
Anson, Me.	George Hovey	Dodge	Conrad, Ia.	Case Motor Car Co.	Case
Anson, Me.	George Hovey	Dodge	Cortland, N. Y.	C. M. Smith	Case
Appleton, Wis.	Appleton Ford Co.	Ford	Colton, Wash.	S. Swensen	Overland
Bangor, Me.	Uutterback-Gleason Co.	King	Creston, Ill.	Louie Vesta	Case
Battle Creek	Battle Creek Auto Sales Co.	Oldsmobile	Cumberland, Va.	Cumberland Garage	Case
Boston, Mass.	H. Ross Maddocks	Stewart	Delaware, Ohio	J. J. Neville	Buick
Boston, Mass.	C. P. Robinson Co.	Regal	Delaware, Ohio	J. J. Neville	Ford
Boston, Mass.	R. W. Vining	Paterson	Dixon, Ill.	Wilson Auto Co.	Oldsmobile
Boston, Mass.	E. Y. Stimson	Milburn	Douglassville, Pa.	John C. Egolf	Detroiter
Boston, Mass.	E. A. Gilmore	Allen	Dowagiac, Mich.	Wilford Miller	Reo
Boston, Mass.	Brown-Apperson Co.	Apperson	Denver, Colo.	J. S. Morrison Auto Co.	Hupmobile
Boston, Mass.	H. Ross Maddocks	Stewart	Denver, Colo.	A. T. Wilson Auto Co.	Chandler
Boston, Mass.	Chas. A. Robinson	Regal	Dodgeville, Wis.	Metropolitan Auto Co.	Koehler
Boston, Mass.	R. V. Vining	Paterson	Dyer, Ind.	Fitch Bros.	Case
Boston, Mass.	E. A. Gilmore	Allen	Englewood, N. J.	Gregory Garage	Oldsmobile
Boston, Mass.	E. Y. Stimpson	Milburn	East Hampton, N. Y.	L. O. Edwards	Case
Boston, Mass.	H. S. Waite Co.	Grant	East Port, N. Y.	Louis S. Tuttle	Case
Brighton, Me.	George Hovey	Dodge	Flushing, N. Y.	Dan'l L. Rapalje	Case
Bridgeport, Conn.	Elm Auto Co.	Koehler	Farmer City, Ill.	Hender Bros.	Oldsmobile
Bridgeport	Thomas Moore	Crow	Fairfield, Wash.	Adams Bros.	Reo
Brier Hill, N. Y.	A. D. Griffin	Case	Fairfield, Ia.	Edwin S. Thomas	Oldsmobile
Brighton, Mich.	W. D. Pitkin & Son	Reo	Fall River, Mass.	Pocasset G. & M. Co.	Oldsmobile
Buffalo, Okla.	C. R. Cool	Case	Fall River, Mass.	Pocasset Garage & Mach. Co.	Oldsmobile
Burlington, N. J.	M. J. Gray	Detroiter	Federalsburg, Md.	R. W. Messenger	Detroiter
Caro, Mich.	Smith & Sutton	Dodge	Ft. William, Ont.	Kam Garage Co.	Case
Caro, Mich.	Smith & Sutton	Oldsmobile	Ft. Smith, Ark.	John Witherspoon	Franklin
Caro, Mich.	Smith & Sutton	Ford	Grantsville, Utah	J. R. Ellason	Case
Camden, N. J.	O. O. Phillips	Detroiter	Gibbsboro, N. J.	Howard Parker & Sons	Detroiter
Calexico, Cal.	A. C. Baskin	Case	Gordon, Pa.	Gordon Garage	Detroiter
Caldwell, Kas.	Jos. Dvorah	Case	Green Bay, Wis.	West Side Garage	Grant

ment warehouse of the Stark company at Appleton as soon as necessary improvements can be made.

Wichita, Kan.—The Anderson Tire and Rubber Co., has moved into its new offices and salesrooms at 121 North Lawrence avenue.

Minneapolis, Minn.—The Dispatch Motor Car Co., this city, will increase its capital from \$50,000 to \$1,000,000.

Weyauwega, Wis.—E. H. Jones & Son has purchased the Weyauwega garage, and will continue the business under the style of Jones Auto Sales Co.

Grand Rapids, Mich.—The Hinckley Motor Sales Co., has been formed by M. M. Hinckley and J. E. Beatty, to handle the R. C. H. cars. Headquarters have been secured at the Allen & Dorothy garage, Ionia avenue.

Columbus, O.—The Portable Garage and Construction Co. of Columbus, Ohio, incorporated recently with a capital of \$5,000 has started to manufacture portable all-steel garages for private use. B. H. Thompson is at the head of the company.

Findlay, O.—The Electrical Motor and Construction Co. of this city has increased its capital stock from \$15,000 to \$30,000 and established branch houses at Fostoria and Norwalk. In the spring the company will build an addition to the plant in this city.

Racine, Wis.—M. E. Laux, who has conducted a large garage and repair shop at Seventh and Wisconsin streets, Racine, Wis., for several years, has formed a partnership with John Smader of Caledonia, Wis., and henceforth the concern will be known as

Laux & Smader, handling the Lewis VI, Ford, Buick and Sphinx. The garage is two stories high and 70 by 80 feet in size.

Columbus, O.—The Anderson Motor Sales Co., 244 North Fourth street has been organized to handle the Apperson in central Ohio.

Cincinnati, O.—Papers have been filed increasing the authorized capital of the Miami Vulcanizing and Rubber Co. of Cincinnati, from \$15,000 to \$25,000.

Grand Rapids, Mich.—The Reno Mfg. Co., has been organized by Earl De Kruif, William Block and Reno Offringa. The concern manufactures the Reno polish.

Seattle, Wash.—The Pilot car now is established at Broadway and Union streets, with the Pilot Car Sales Agency under the management of Stratton & Barager.

Chicago.—W. H. Ehrhart of San Francisco, Cal., has closed with the Triple Action Spring Co. for the distribution of Johnson shock absorbers for the state of California.

Almond, Wis.—William Millus and Charles Nelson of Almond have purchased the Almond Garage Co., Almond, Wis., and will install additional machinery and vulcanizing appliances.

Indianapolis, Ind.—R. B. Parrott has become a stockholder in the Oakes Pressed Steel Co., Indianapolis, and is actively associated with the company, having charge of the buying.

St. Louis, Mo.—The McQuay-Norris Mfg. Co., makers of the Leak-Proof piston ring, has appointed Charles L. Derrickson its general representative to travel the entire country. Mr. Derrickson will look after all ter-

ritories working in conjunction with the numerous branch offices in the United States and Canada.

Baraboo, Wis.—Herman Platt has purchased the Gollmer garage at Baraboo, Wis. He is a brother to William Platt, who purchased the machine shop department of the Gollmar Bros. Co. several months ago.

Detroit, Mich.—S. A. Winsor and W. J. Clarke are managers of the offices which have been opened at 965 Woodward avenue by the Spencer Smith Machine Co., manufacturer of pistons in Howell, Mich.

Oshkosh, Wis.—The Oshkosh Metal Products Co., manufacturing a varied line of specialties and operating a machine and repair shop, has filed a voluntary petition in bankruptcy, scheduling assets at \$15,339 and liabilities at \$44,133.

Morristown, N. J.—A new company has been organized, known as the Cain-Henry Motor Car Co., to handle the Haynes and Oldsmobile cars in Sussex and Morris counties. A branch service station will also be opened in Summit, N. J.

Toledo, O.—The Grant Motor Sales Co., headed by John W. Phillips, has been organized at Toledo, to handle the Grant in this section. A contract has been closed with the Grant Motor Car Co. to act as distributor in northwestern Ohio.

Detroit, Mich.—E. D. Smith, until recently manager of the car order department of the Chalmers Motor Co., has resigned to become manager of the Detroit branch of the Reed Self-Adjusting Weather Strip Co., Wichita, Kan. Offices have been secured at 805 Chamber of Commerce building.

Recent Agencies Appointed by Motor Car Manufacturers—Continued

PASSENGER CARS

Town	Agent	Make	Town	Agent	Make
Greenport, N. Y.	John Kluge	Case	Mineola, N. Y.	Thos. F. Roche	Case
Grand Rapids, Mich.	Remington Sales Co.	Remington	Middlebranch, Ohio	J. H. Werner	Oldsmobile
Glen Ridge, N. J.	Glen Ridge Auto Co.	Oldsmobile	Montreal	Automobile Tire & Supply Co. Ltd.	National
Harrisburg, Pa.	E. C. Ensminger	Detroiter	Montmorency, Mich.	George F. Listor	Ford
Hartford, Conn.	George H. Weeks & Son	Case	Mt. Carroll, Ill.	Walter E. Brown	Case
Hartford, Conn.	Harry Starkie	Chevrolet	Mt. Union, Pa.	C. S. Price	Detroiter
Hartford, Conn.	F. L. Caulkins & Co.	Stutz	Needles, Cal.	H. E. Benedict	Oldsmobile
Hartford, Conn.	Geo. H. Weeks & Son	Case	New York City	J. G. Simmons Auto Co.	Oldsmobile
Hazleton, Pa.	William Oelwine & Son	Detroiter	New Orleans, La.	M. Zilberman	Oldsmobile
Hillsboro, Wis.	Richard Brothers	Case	New Glarus, Wis.	Hoesly & Hoesly	Case
Hutchinson, Kas.	E. H. Steinford & Rexroad Engineering Co.	Case	New London, Conn.	J. F. Day	Case
Huntington, W. Va.	Chester T. Rabert	Oldsmobile	New Orleans, La.	Fairchild Auto. Co.	Chandler
Hempstead, N. Y.	National Garage Co.	Case	Newark, N. J.	North Grove Garage	Case
Hicksville, N. Y.	Chas. A. Reinhard	Case	North Emporia, Va.	R. T. Taylor	Case
Indianapolis, Ind.	E. H. Wilson	Scripps-Booth	Ocean City, N. J.	B. Frank Smith	Detroiter
Indianapolis, Ind.	H. Hill & D. B. Grant	Sphinx	Oyster Bay, N. Y.	Sagamore Garage Co.	Case
Indianapolis, Ind.	Wildhack Co.	Oldsmobile	Pana, Ill.	F. P. Renz	Koehler
Islip, N. Y.	Gates Auto Garage	Case	Park Falls, Wis.	J. B. Saunders	Case
Iron River, Mich.	Iron River M. C. Co.	Case	Pontiac, Ill.	Wm. Algeo	Case
Jacksonville, Fla.	Portage Tire Co.	Trumbull	Perryopolis, Pa.	D. & S. Garage	Oldsmobile
Landisville, N. J.	C. F. Riedel	Detroiter	Petaluma, Cal.	A. J. Wilen	Oldsmobile
Lewisburg, Pa.	F. H. Smith	Detroiter	Preston, Md.	H. M. Hollis & Co.	Oldsmobile
Landa, N. D.	O. F. Olson	Oldsmobile	Quogue, N. Y.	Charles W. Berry	Case
Lansing, Ia.	Hufschmidt & Wendel	Case	Richland, N. Y.	W. O. Paddock	Case
Lake Crystal, Minn.	William R. Roberts	Case	Racine, Wis.	W. R. Taylor Motor Co.	Case
Lynn, Mass.	W. S. Russell Co.	Haynes	Racine, Wis.	W. R. Taylor Motor Co.	Cadillac
Lena, Wis.	N. C. Netzer	Case	Racine, Wis.	W. R. Taylor Motor Co.	Paige
Louisville, Ohio	J. G. Wolfe	Oldsmobile	Racine, Wis.	W. R. Taylor Motor Co.	Dodge
Lock Haven, Pa.	J. S. Waite & Co.	Detroiter	Randolph, Wis.	T. A. Cummings	Maxwell
London, Ohio	E. P. Chenoweth	Buick	Racine, Wis.	Laux & Smader	Lewis VI
Madison, Me.	George Hovey	Dodge	Racine, Wis.	Laux & Smader	Ford
Marietta, O.	Jacob Spindler, Jr.	Oldsmobile	Racine, Wis.	Laux & Smader	Buick
Manistee, Mich.	Traverse Auto Co.	Ford	Racine, Wis.	Laux & Smader	Sphinx
Manistee, Mich.	Charles M. Otis	Oldsmobile	Reading, Penn.	Pennsylvania Garage	Oldsmobile
Madalin, N. Y.	Traverse Auto Co.	Reo	Reading, Pa.	Star Motor Car Co.	Detroiter
Middletown, Conn.	F. L. Caulkins & Co.	Stutz	Ripley, O.	Cochran & Co.	Koehler
Millerton, N. Y.	Millerton Garage	Case	Ridley Park, Pa.	William N. Erskine	Detroiter
Milford, N. H.	Souhegan Auto Co.	Ford	Rockland, Mass.	C. H. Hubbard & Sons	Trumbull

COMMERCIAL CARS

Fall River, Mass.	Pocasset Garage & Machine Co.	G-M-C	Racine, Wis.	W. R. Taylor Motor Co.	Stegeman
Holland, Mich.	Fred W. Jackson	Jeffery	Topeka, Kan.	Rehkopf Brothers	G-M-C



From the Four Winds

CLUB Changes Name—The Genesee Automobile Club of Genesee, N. Y., has changed its name to the Genesee Valley Automobile Club. Gates M. Minckler is the new president.

New Chauffeurs' Club—The Toledo Chauffeurs' Club of Toledo, Ohio, has been incorporated without any capital stock, for the mutual interest of its members by John M. Wells and others. Club rooms will be secured.

Mutual Insurance Company Formed—The Auto Insurance Co. of Norwalk, O., has been incorporated under the laws of Ohio for the purpose of operating a mutual motor car insurance company. It is planned to insure motor cars and trucks against fire and theft. Dale A. Critz is the organizer of the company.

To Jitneyize Cincinnati—Cincinnati promoters are organizing a jitney bus line to compete with the local street car system. It is proposed to run the line over Eighth street from Race street to a point a mile farther than the street car line reached on Warsaw avenue. John J. Radel is in charge of the project.

Money for Philadelphia Roads—If a bill introduced at Harrisburg, Pa., by Representative Dunn becomes a law, Philadelphia will secure an appropriation of \$300,000 for the improvement of roads in the suburban districts of the city, the appropriation being contingent upon the setting aside of a similar sum by the municipality.

Rockford Club Elects Officers—The Rockford Motor Club of Rockford, Ill., elected new officers for the ensuing year last week as follows: President, A. J. Holtz; vice-president, Julius Hanson; secretary, E. A. Anderson; treasurer, T. L. Sizer. One of the big projects of the club for the coming year is the erection of a new home on the Rock river a few miles outside of the city. A picturesque site has been secured and a luxurious club house is to be built. The structure will be ready for occupancy by next fall.

Ohio Wants State Aid—Ohio counties generally are waking up to the possibilities of highway improvement under the Ohio highway law and are petitioning for state aid for the improvement of their roads. Of a total of 9,844.4 miles in the inter-county highway system up to January 1, 8,310 miles or 84 per cent have been signed for which insures their improvement during the present year. Out of the eighty-eight counties in the state sixty-three counties have applied for state aid in road building. Only two counties in the state, Lucas and Shelby, have not petitioned for state aid under the Ohio road law.

Motor Cars Save City Money—In the report of the board of health of San Francisco, Cal., it was stated that the use of motor cars has considerably reduced the cost of the inspection work by the department. During the last 6 months the expenses of outside dairy inspection by two veterinarians was lowered from \$1,086.25 to \$616.46, or a saving of \$469.79. The expenses of the two veterinarians were reduced from \$527.10 to \$262.46 for the first one and from \$559.15 to \$354 for the second one, or 50 per cent saving for the first and 35 per cent for the second. The chief plumbing inspector, M. Farrell, reported

that he traveled 3,995 miles, the expense being 1.7 cents per mile; 13.4 miles were covered per gallon of gasoline and 338 miles per gallon of oil.

Careful in Montreal—Taking the city of Montreal as a comparison with other cities of the same population (600,000) there are comparatively fewer motor car accidents in Montreal. Out of 5,000 motor cars only twenty-seven serious accidents were recorded last year. A remarkable growth of motor car followers in the dominion is apparent by the fact that in the past 2 years the number of cars owned in Canada has increased almost 100 per cent.

New Ferry Rates—The Erie Railroad has put into effect higher rates for vehicles carried by its ferries in New York city. Under the new rules everything will be put on a basis of weights. A six-passenger car now is carried for 50 cents. Under the old rates a six-passenger car was carried for 45 cents. Under the new rates a car of this type will pay 3 cents for each passenger beside the driver. Such a car, with four passengers besides the driver, would pay 37 cents on the D. L. and W. ferry and 60 cents on the Pennsylvania. A one-horse delivery wagon, with its driver, heretofore has paid only 13 cents. From now on, the lowest charge for such a vehicle will be 25 cents.

Teaching Spanish at Racine—To meet the demand for instruction in Spanish occasioned by the inability of stenographers and correspondents in Racine manufacturing plants to cope with the South American mail now coming in, the Racine board of education has instituted a course in this language in connection with the evening high school courses conducted each winter. The initial enrollment in the Spanish course was eighty-two and has now reached more than 100. The Case, Mitchell-Lewis and L. P. C. motor car companies and numerous other factories in Racine are developing an extensive trade with South American nations and it has been found necessary to import correspondents and stenographers from large cities to handle the mail.

Motoring Course at State University—A novelty in western colleges was the short course on the motor car industry which was taken up this week at the University of Illinois. J. G. Thorpe, formerly professor of steam engineering, had charge of the course. All lectures were illustrated with stereopticon slides, showing every detail of the construction and operation of a car. The first lecture referred to the motor car as a factor in American industry, with a review of the past 10 years, something of the men who have been prominent in the construction of cars, and concluding with a reference to the application of the car to business and pleasure. The second lecture was devoted to the 1915 car with a description in non-technical language of the modern machine, showing classification and mechanical details with a description of the various parts. The third lecture showed how to take care of a car; the necessity for proper lubrication and the relation of good operation to long life. The winter care of the car also was discussed, the lecture concluding with some decisions of the supreme court in relation to road laws, drivers etc. The final lecture told of the application of electrical equipment; the methods of starting; the lighting equipment and ignition systems, and other phases of operation. There was a large and interested

attendance of the students at each lecture and it is likely that the faculty will authorize another course in the spring.

Hupp Establishes Factory School—The Hupp Motor Car Co. has established a factory school, where the employes will be taught all that which is deemed advisable to make them more efficient.

Chalmers Again Honored—At the annual election of officers of the Detroit Athletic Club, Hugh Chalmers, president of the Chalmers Motor Co., was re-elected for the third consecutive year as president of the athletic club. Henry B. Joy, president of the Packard Motor Car Co., was elected first vice-president.

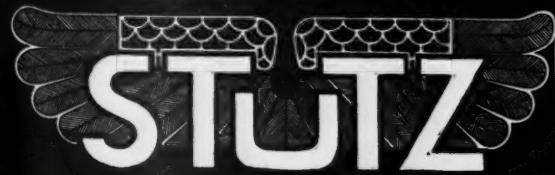
Stopping a Leak—It is estimated that car owners of Philadelphia have been losing approximately half a million dollars a year because of false bottom gasoline measures. The local bureau of weights and measures is conducting a "How to Buy" exhibition and hundreds of these measures are on view. Through the activity of inspectors this practice has been largely eliminated.

Roads Course Attracts Fifty Pupils—The Winter Good Roads School, under the auspices of the Ohio State University, Columbus, O., opened last week with more than fifty students. It is the third annual course in highway building and maintenance given by the state university and is becoming more popular each year. The course consists of 2 weeks' lectures by experts in road construction.

Australian Government Buys Trucks—Every motor truck suitable for war purposes in Australia has been commandeered under government orders. In New South Wales and Victoria 160 have been secured and it is expected that an additional 100 will be secured from the other states, making 260 in all. Not one 3-ton truck is available for business purposes in Australia today. Industrial concerns which have lost their trucks are purchasing any kind of conveyance to meet their delivery requirements. At the present time a large number of light delivery vehicles mounted on Ford, Overland, Buick and Studebaker chassis are being used. Business interests are rapidly learning the utility of such vehicles, and many Australian agents are considering the advisability of purchasing American-made light delivery trucks to meet their requirements.

Another Trail for Canada—If highway enthusiasts in the eastern end of the province of Quebec can secure the needed municipal and government support, there will soon be another provincial highway under construction, similar to the Toronto-Hamilton road but narrower and less costly. W. A. MacLean, provincial engineer of highways, has had a conference with a group of well-known men interested in the building of a highway from Ottawa to Prescott. The type of road figured upon represents a cost of about \$10,000 per mile or a little more than half the cost of the Toronto-Hamilton highway. It probably would be built 10 feet wide with the base constructed to allow the addition of shoulders later. A rough division of the cost—about \$600,000—would give Ottawa a burden of \$180,000, the townships a similar amount, and the Ontario government \$240,000, or \$4,000 a mile for 60 miles. The scheme is yet in the tentative stage but is progressing well.

America's
Road Race
Champion



STUTZ

Indomitable
in Everyday
Service



"H.C.S." 4 Cylinder-\$1475

The Car of
the
Spurless
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**4-Cylinder
Models**

\$2000 Bearcat
\$2000 Roadster
\$2250 Bulldog
\$3675 Sedan

**6-Cylinder
Models**

\$2125 Bearcat
\$2125 Roadster
\$3800 Sedan
Write for Catalog

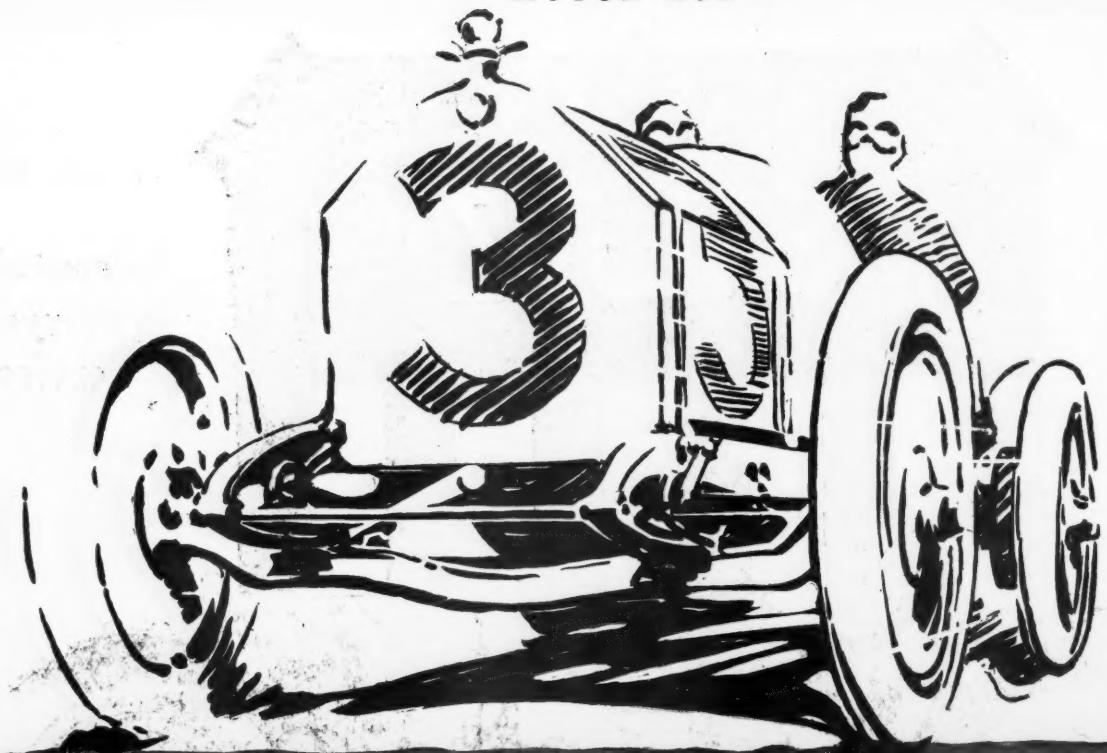
Stutz Motor Car Co.

AGENCIES IN ALL

Indianapolis, Ind.

PRINCIPAL CITIES

When Writing to Advertisers, Please Mention Motor Age.



SCHEBLER

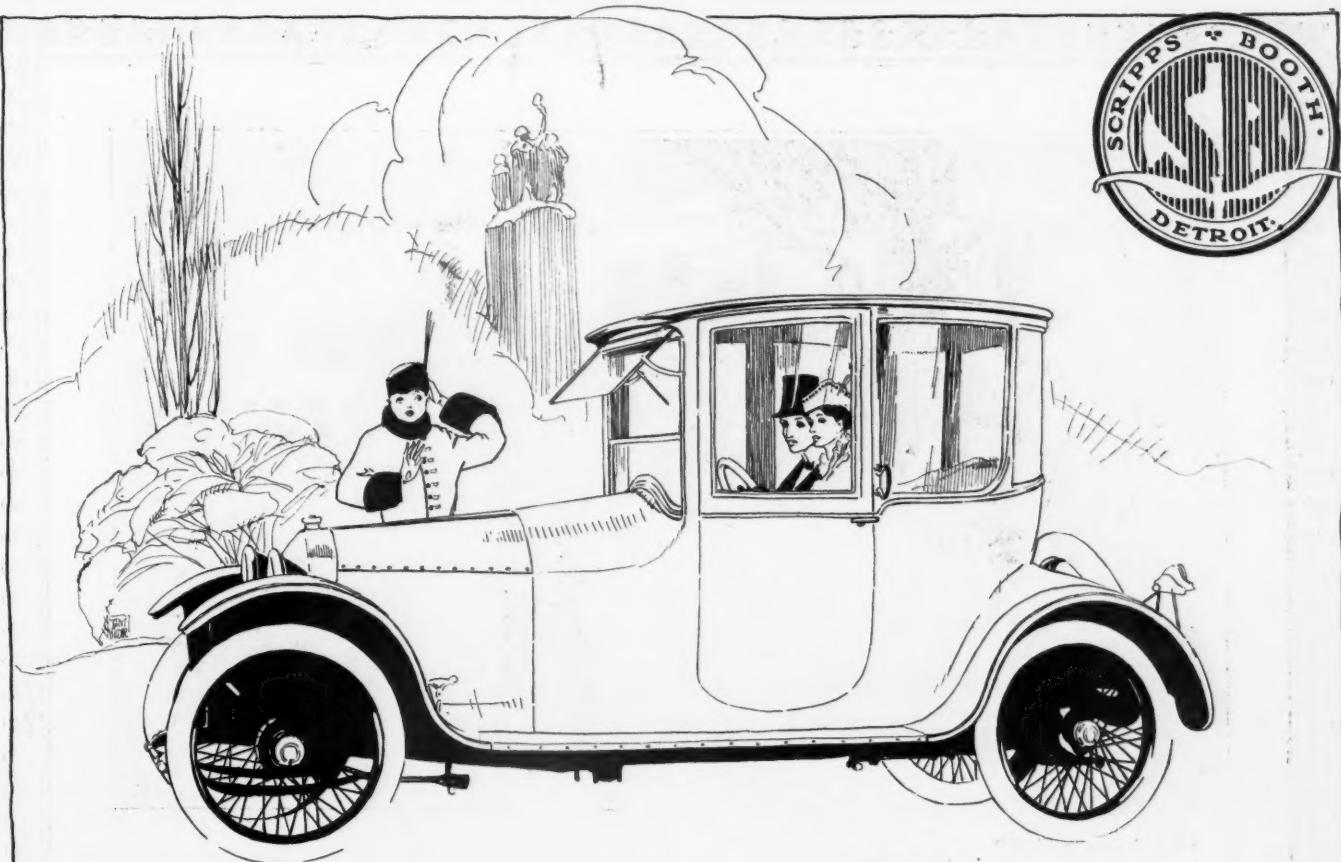
WORLD'S RECORD-CARBURETOR

STANDARD
EQUIPMENT
ON AMERICA'S

CHAMPIONS

WHEELER AND SCHEBLER
INDIANAPOLIS

INDIANA U.S.A.



Beauty with Comfort

The Shows have proved the new standard of beauty and luxurious equipment of the new Scripps-Booth cars.

Only a ride can convince you of their higher standard of comfort and personal motoring enjoyment which is the result of the adoption of the most up-to-date comfort principles.

Light weight is only one feature of these cars making for easy riding and handling in the rough places.

Scripps-Booth luxurious light cars are a new criterion of motor car building. Your dealer can convince you.

Scripps-Booth Company, Detroit, Mich.



"Which way, my lad?"
 "Straight ahead, Sir; and a bad road!"
 "No matter; this car will make it!"

A Strikingly Original Oldsmobile

IT combines a big car appearance, with big car efficiency and big car luxury—without big car cost. It presents the unique achievement of putting a four-cylinder car in the six-cylinder class. In all essentials it is in a class with high-priced sixes. But in price, simplicity, and economy of operation it is in the class of the best low-priced fours.

The owner of a Model 42 Oldsmobile has a car of \$5000 satisfaction. He will find constant occasion to be *proud* of the looks of his car; *proud* of the comfort and luxury it affords and *proud* of its performance under all conditions of travel.

Note These Features:

Famous overhead valve motor
 Circassian walnut dash and steering wheel
 Delco starting and lighting systems
 Genuine honeycomb radiator with real German silver casing

Cast aluminium foot and running boards
 High quality speedometer
 Eight day clock
 Weight 2495 lbs.
 Price \$1285 f. o. b. Lansing, Mich.

Are you interested in the agency for such a car? Complete descriptive catalog M will be sent you on request.

Established 1886 Incorporated 1899

OLDS MOTOR WORKS
 LANSING - MICHIGAN

Oldsmobile



Outdoor Sports No. 77

Post-Mortem via Long-Distance

A hurry call to the battery morgue for a coroner's inquest. 'Twasn't murder—in fact the cause of death is not clear. Everything seemed to be all right when he left the city, but now there's no juice. Lights out, no ignition, starter on the blink!

They told him at the garage last week he ought to buy a *good* battery. In fact, they specified a Willard. But he couldn't see it then. Now he's willing to listen to reason.

Just one of many who have fallen in line after cutting their eye teeth. Why doubt the intelligence of 85% of American makers of electrically equipped cars? If they're more than satisfied with Willard batteries, there must be something to it.

Willard Storage Battery Company Cleveland, Ohio

NEW YORK: 228-30 W. 58th St.
CHICAGO: 2524-30 S. Wabash Ave.

INDIANAPOLIS: 318 North Illinois Street

DETROIT: 736-38-40 Woodward Ave.
SAN FRANCISCO: 821 Monadnock Bldg.

SERVICE STATIONS IN ALL PRINCIPAL CITIES IN THE UNITED STATES,
CANADA AND MEXICO



Moline-Knight "40"



\$1475

A New Selling Field is Opened Up By This Special Class Car

Persistent demands from owners of poppet valve motor cars caused us to develop the New Moline-Knight 40 at \$1475.

There are thousands of car owners who have long wanted to drive a sleeve valve type of motor but could not afford the prevailing high prices—they can now meet this long felt want.

The identical demand that caused us to build this low priced Knight should create in you—a dealer—a desire to sell it.

In building this big 40 horse power Moline-Knight with 118 inch wheelbase and 34 x 4 inch tires, every convenience and comfort for passengers and the man behind the wheel has been carefully considered.

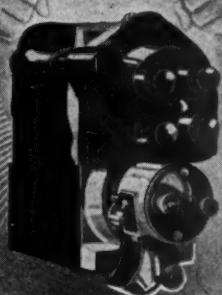
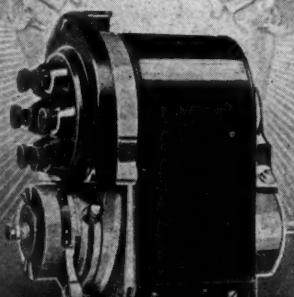
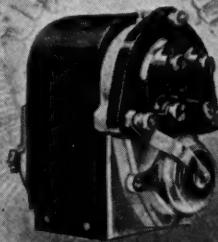
Digest the specifications and write for detailed information regarding our complete line consisting of the 40 H. P. 5 pass. touring car at \$1475, and 50 H. P. touring, roadster, limousine and sedan models ranging in price from \$2500 to \$3800.

Specifications

Light weight—under 3,000 lbs. ready for the road.
118 in. wheelbase.
Knight sleeve valve motor
Guaranteed 40 h. p.
34 x 4 tires—non-skid rear.
Power Pump.
Five passenger.
Selective, three speed transmission.
High tension ignition.
Left hand drive.
Center control.
Electrically lighted and started.
Screw and nut steering gear.
V shaped radiator.
Thermo-syphon cooling.
Unusually deep, hot riveted pressed steel frame.
Full floating, spiral bevel gear rear axle.
Force feed lubrication.
\$1475.
Write for detailed specifications.

Moline Automobile Company, East Moline, Ill.

SPLITDORF

DIXIE
TYPEMODEL EU4
HIGH TENSION
MAGNETOCUNNINGHAM
HIGH TENSION
MAGNETOMODEL EU4-2
HIGH TENSION
MAGNETO

The wise motorist insists
upon magneto equipment
on any car he owns

OVERLAND

ignition for 1916 will be exclusively

DIXIE

The Willys-Overland Co. has placed the
largest magneto order ever given

For their entire 1916 output

SPLITDORF ELECTRICAL CO.
NEWARK, NEW JERSEY

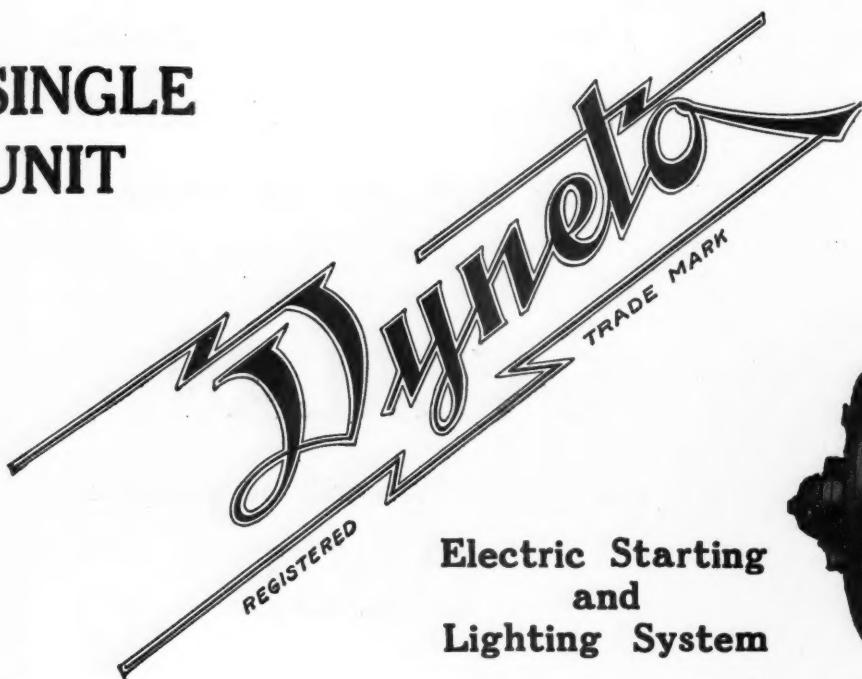
*(All SPLITDORF features are fully covered by
patent or patents pending)*

Isn't a Car Dealer and a Prospective Owner Entitled

*to the Best Starting and Lighting
System a Manufacturer Can Buy?*

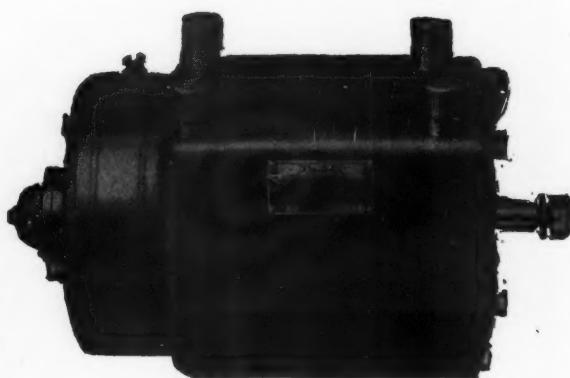
AND ONE THAT IS PRACTICALLY NOISELESS

SINGLE
UNIT



Electric Starting
and
Lighting System

Ask Any Franklin
Dealer or Owner



“Never a Stalled Engine”
UNIFORM QUALITY

We use pressed steel where others use castings—thus reducing weight and obtaining highest magnetic qualities. We use best alloy steels specially treated—not ordinary machine steel. Our brushes are specially compounded for our motor-generator, assuring long life and efficiency.

Write for Catalog and Particulars

DYNETO ELECTRIC COMPANY, Syracuse, N. Y.

SEND US YOUR ELECTRICAL PROBLEMS

The Truck Question

—are *you* facing one?

Does your particular problem of transportation present a difficult angle? If it does, then you should know what aid you can draw from General Motors Truck Co., the world's only manufacturers of a full line of both gasoline and electric trucks.

GMC Trucks are being operated in most all lines of business in all parts of the country. Our experience thus gained is at your disposal in solving *your* truck question.

GENERAL MOTORS TRUCK CO

One of the Units of General Motors Company

PONTIAC, MICHIGAN

Branches: New York, Detroit, Boston, Chicago,
Philadelphia, St. Louis, Kansas City, San Francisco

Electric

Chassis Prices

(Without Batteries)

Capacity	Price
1000 lbs.	\$1200
2000 lbs.	1300
3000 lbs.	1450
4000 lbs.	1650
6000 lbs.	1900
8000 lbs.	2100
10000 lbs.	2350
12000 lbs.	2500

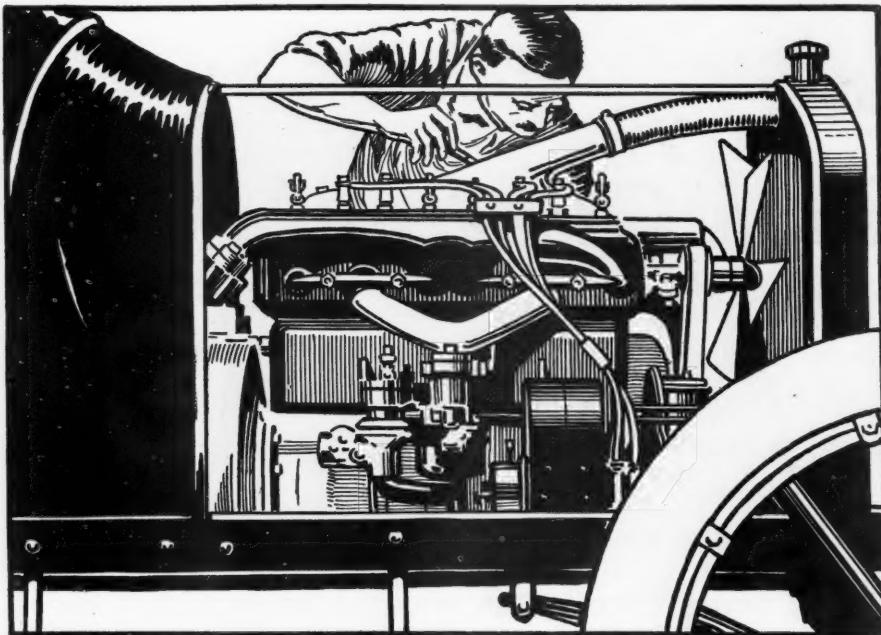
Gasoline

Chassis Prices

Capacity	Price
1500 lbs.	\$1090
1 1/4 Tons	1500
2 Tons	1900
3 1/2 Tons	2500
3 1/2 Tons	2500
5 Tons	3000
5 Tons	3000



When Writing to Advertisers, Please Mention Motor Age.



NOW
is the time
to overhaul
your car

Even though the
car has been idle,
Oil may have
rotted the rubber
in the wires.

Automobile manufacturers in their instruction books show from 65 to 75 places to be lubricated. Oil "creeps" and once it gets to your wiring, there is trouble ahead, for Oil works while you sleep.

This hard-to-locate trouble *can* be avoided.

There is a cable that resists oil,—it is

Packard

Protected Cable

Use it and get Better Service from your Lighting Dynamo, Starting Motor, Battery and Ignition System, *and* you'll not have to rewire every Spring.



Combination High Tension Cable



Lighting Cable

Dept. C

The Packard Electric Company

(110)
WARREN, OHIO

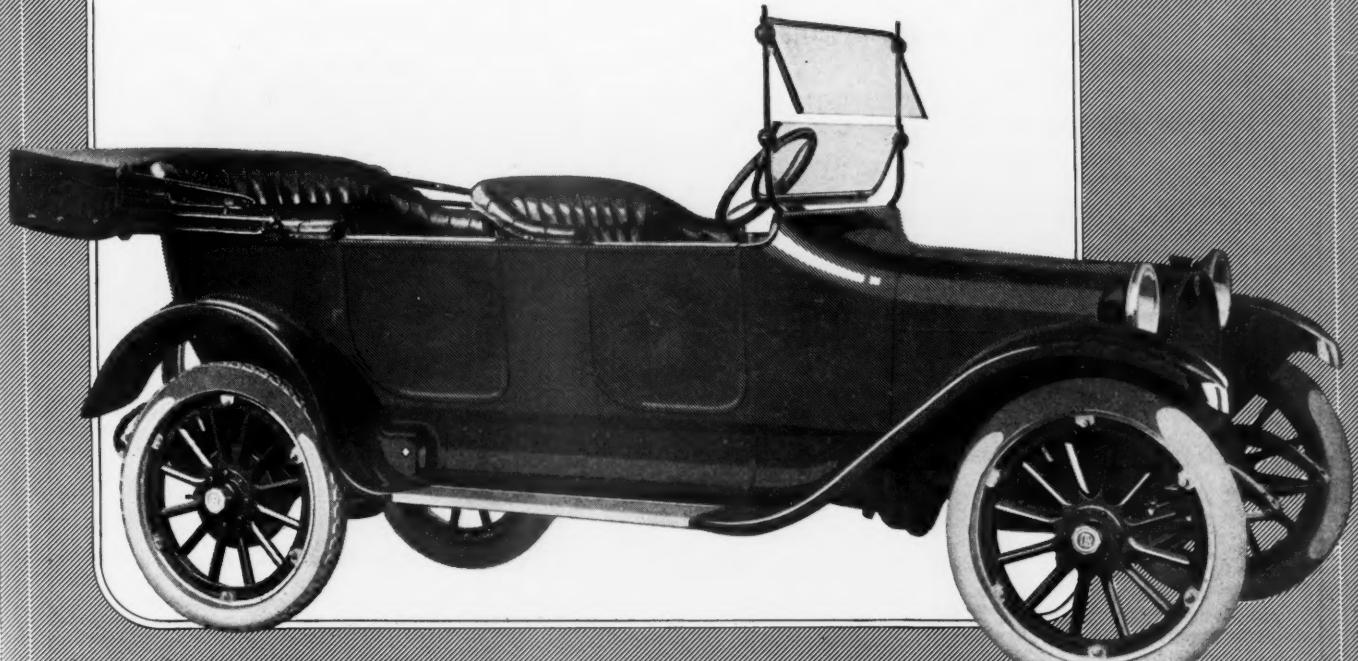
DODGE BROTHERS MOTOR CAR

Qualities which the eye cannot see—fine workmanship, fine adjustment of parts and fine balance—reveal themselves in the way the car sticks to the road at high speed

The car weighs only 2200 pounds, but that weight is so perfectly distributed that it holds steadily to a straight-ahead course. The passengers feel scarcely a particle of vibration even when the engine is exerting its full quota of power

The wheelbase is 110 inches
The price of the car complete is \$785
f. o. b. Detroit

DODGE BROTHERS, DETROIT





From an installation standpoint, the greatest advantage found in the new Eisemann Type G-4 is the remarkably simple method of timing.

Compared with all previous construction of practically all magnetos the question of timing the Eisemann Type G-4 magneto to the motor is simplicity itself.

Bring cylinder number one to dead center, which is the firing point. Remove the distributor plate from the magneto and turn the driving axle of the armature until the setting mark on the distributor disc is in line with the setting screw.

When this position of the armature is obtained the driving medium is fixed and the cables are then connected to the spark plugs (in anti-clockwise rotation, setting mark L is used).

The Eisemann Magneto Co.

Sales and General Offices
32-33d St., Brooklyn, N. Y.

New York Indianapolis, Ind. Detroit, Mich.
245 W. 55th St., 415-417 N. Capitol Ave. 802 Woodward Ave.

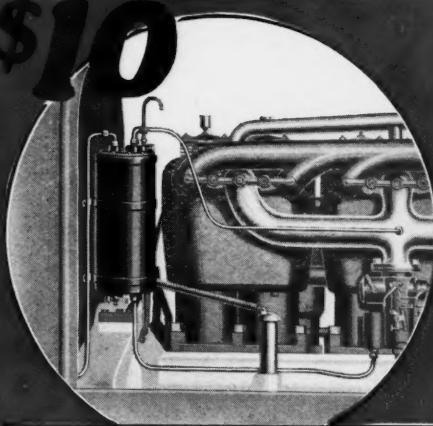
Simple Timing of Type G4



End view of the magneto showing the distributor disc, the make-and-break mechanism and the timing marks.

Endorsed by Actual Use on 1,500,000 Cars!

\$10



**Stewart Vacuum
Gasoline System**

Entirely eliminates all pressure and gravity feed nuisances. The big sensation of all the Automobile Shows. For any car—old or new. Big seller.

1,000,000 Cars Need This!

\$5



Stewart Speedometer

Magnetic Type

Look the truth in the face and you'll find 90% of all car manufacturers regularly equip with Stewart—the magnetic type speedometer. Over 1,300,000 in use.

"Always on the job!"

Stewart Warning Signal

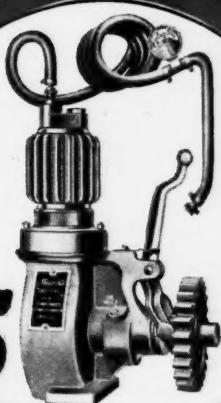
"Makes them pay attention!"

Why try to sell other signals when the Stewart is the best and handsomest made and competition so keen? The big demand is for the hand-operated signal. "\$5. No need to pay more!"

"Easier to sell it than to compete with it!"

Stewart Necessities

\$15



Let the Stewart Tire Pump do your hard work

Installed in an hour by anyone on any car—old or new. Not possible to build a better or more efficient tire pump at any price. Complete, with 15 ft. highest grade hose, accurate air gauge with bracket and gears.

"Big year for Tire Pump Sales!"

\$12



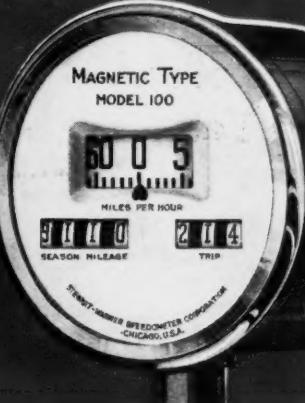
Electric Clock

Every car
needs one!

\$15 Ready to install
on any car!

An electric self-winding clock that is right. Handsome, accurate, perfect timekeeper. Dealers are selling by thousands.

Winds Itself!



Stewart Speedometer

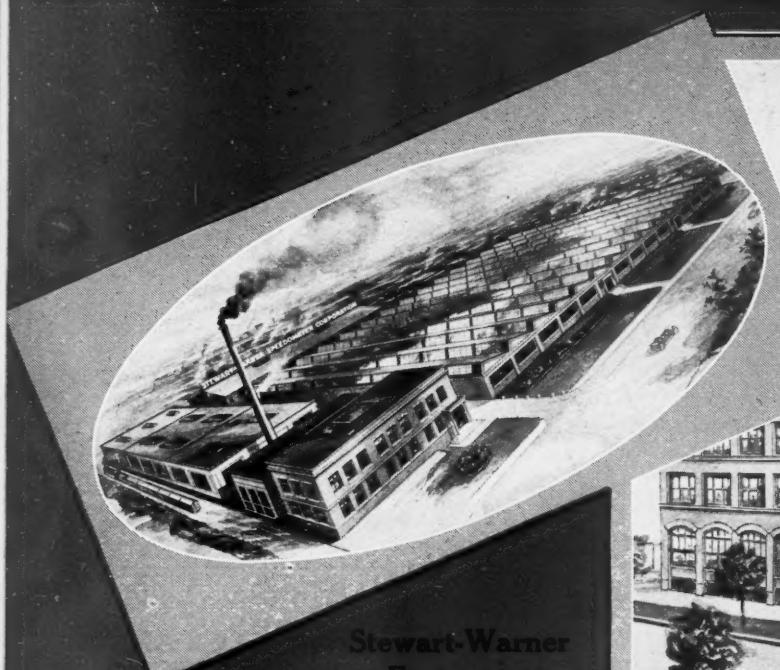
Magnetic Type

FORD Special, Complete

Don't overlook the big volume of sales to thousands of FORD car owners. 150,000 FORD cars still without speedometers. Here's your chance to sell one for every car.

100,000 Sold in 7 Months!

Stewart-Warner Speedometer Corporation, Chicago and Beloit, U.S.A.



Stewart-Warner
Factory at
Beloit, U. S. A.



New 7-story Stewart-Warner Factory at Chicago, U. S. A.

Largest in

The
Organization
Behind
You

The Stewart-Warner Speedometer Corporation is the largest producer of Automobile Accessories in the world.

Stewart products are backed by the biggest advertising campaign of any Automobile Accessories.

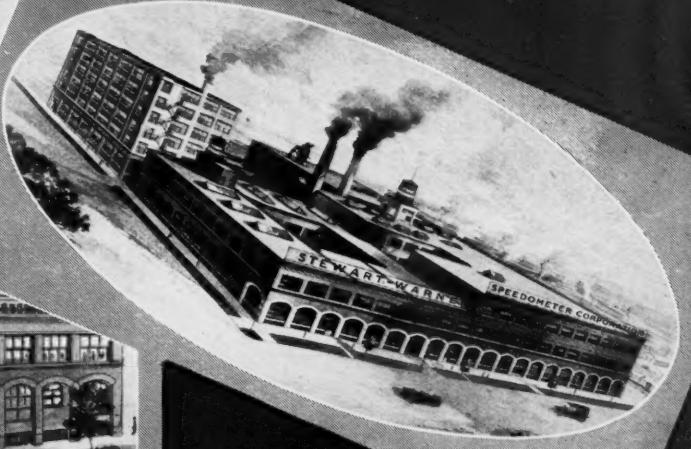
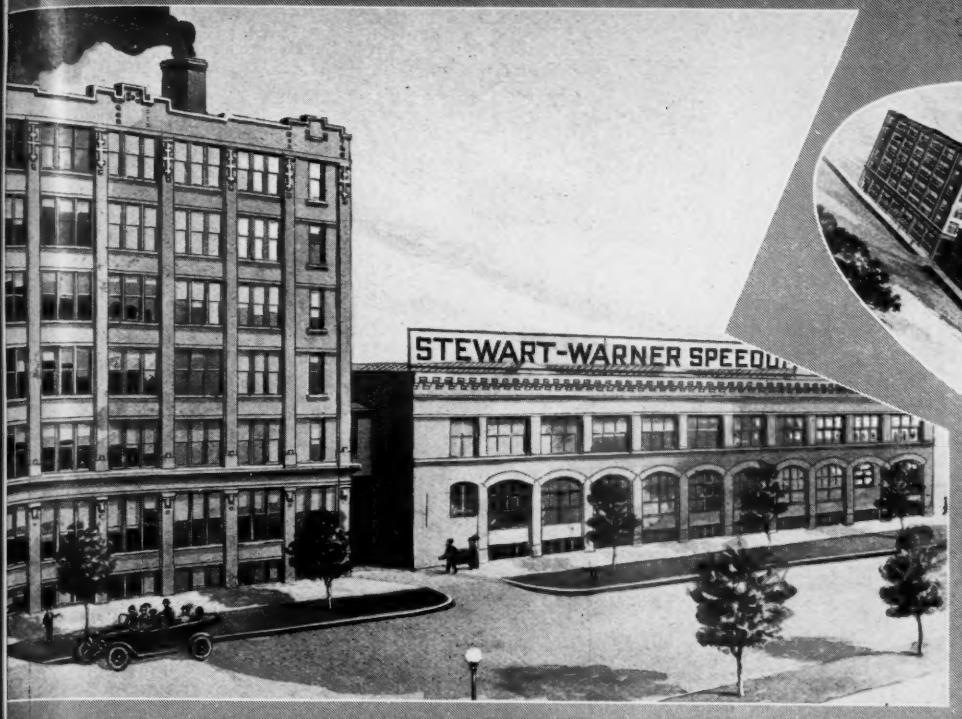
Stewart Products are the fastest selling of all Automobile Accessories on the market.

At the end of this season over 2,000,000 cars will carry Stewart Products.

Our manufacturing plants cover $6\frac{1}{2}$ acres of ground. These facilities enable us to take care of orders promptly regardless of quantity. We maintain 17 Branches, and 78 Service Stations in all cities and large towns.

Stew

Automobile



Stewart-Warner
Factory at
Chicago, U. S. A.

Largest Automobile Accessories Factory in the World

the World

30 Days' Trial

Our
Liberal
Guarantee

Stewart Products are fully guaranteed for one year from date of purchase and are sold with the understanding that if not satisfactory after 30 days' trial, purchase money will be refunded.

All Stewart Products can be installed by any one, on any car—old or new.

start

Necessities



What the Stewart Standard means for every Dealer

Prestige: Makes Stewart Products easier to sell than to compete with—an invaluable asset to every dealer—a recognition of merit accorded them by the entire automobile industry—gives them first call with every automobile owner.

Quality: The best and most suitable material, costliest workmanship and correct design are embodied in all Stewart Products.

Service: Unlimited facilities guarantee unequaled service from the moment the order is received throughout the life of the car on which the product is used. Six and one-half acres of manufacturing plant, 17 branches and 78 service stations in all cities and large towns insure service that cannot be duplicated.

Satisfaction: There is no way to make Stewart Products better. All are sold on 30 days' trial, or money refunded, and after the sale the Service given is unsurpassed. Satisfaction is therefore assured and guaranteed.

Stewart-Warner Speedometer Corporation

Executive Offices: 1826-52 Diversey Blvd., Chicago

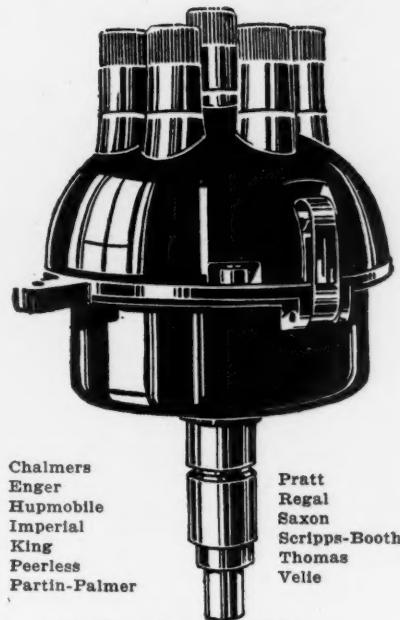
Factories: Chicago and Beloit, U. S. A.

17 BRANCHES—Atlanta, Boston, Buffalo, Chicago, Cleveland, Detroit, Indianapolis, Kansas City, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, London, Paris.

78 SERVICE STATIONS IN ALL CITIES AND LARGE TOWNS

Atwater Kent

Ignition System



Chalmers
Enger
Hupmobile
Imperial
King
Peerless
Partin-Palmer

Pratt
Regal
Saxon
Scripps-Booth
Thomas
Velle

SOME REPRESENTATIVE
ATWATER KENT-EQUIPPED CARS

Straws from the Show

AT the Chicago Automobile Show seventy-seven cars were exhibited.

Of these 77 cars, 34 were magneto equipped, and 43 depended solely on battery ignition. While none of these battery-equipped cars had any other form of ignition, a considerable number of the magneto-equipped cars had auxiliary battery ignition.

Of the 43 cars using battery ignition exclusively, 20 used the Atwater Kent Ignition System. The others were divided between four different makes.

In a word, one-quarter of all the cars at the Show were exclusively Atwater Kent-Equipped.

The reason for its phenomenal growth in popularity is that Atwater Kent Ignition *rounds out the engine performance* at points where other systems leave it weak.

With Atwater Kent Ignition the engine *starts* much easier, *idles* more slowly and quietly, *pulls* stronger at low speeds, and *accelerates* faster than with the ordinary magneto equipment.

Constant spark heat at all speeds, accurate synchronism, correct automatic advance are the birthright of any engine. Atwater Kent Ignition gives them all with unfailing dependability. Its principle is basic.

Atwater Kent Mfg. Works

4934 Stenton Avenue
PHILADELPHIA, PA.

Here is the first "Gold Standard"— in Tire Valuation

SOMEBODY had to do it!

Because, Tire Price-Lists have been getting into the "Joke" Class.

Price-Lists were too generally being *Printed UP* for the sole purpose of being *Discounted DOWN* by the Retailer.

VALUE was being lost sight of, in the hot Competition as to who could quote the *greatest Discount OFF* Price-Lists *padded* up for the purpose.

Absurd, wasn't it,—in an enlightened age, like this?

Some reliable *Standard*, to judge *Values* by, has been badly needed.

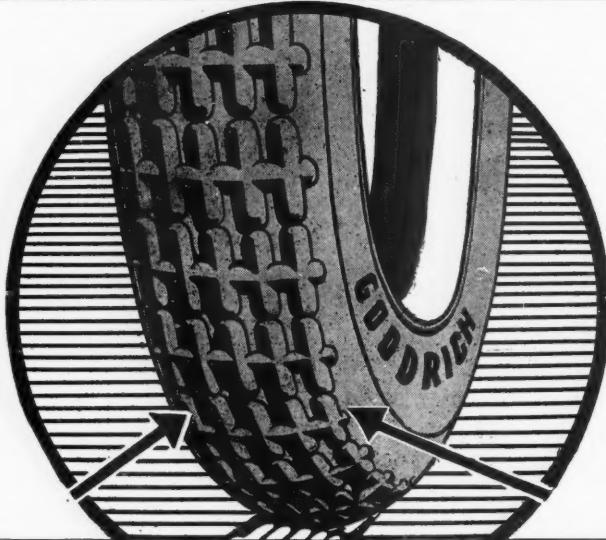
We have the "Temerity" to cut loose from the *Padded Price-List Procession*, and supply it.

At this writing (Jan. 1st, 1915) nine leading Tire Manufacturers Price-List (to Consumers) their 34 x 4 Plain-Tread Tires at following figures (each initial letter represents a well known Tire).

None of these Brands can be proven to *average* more Mileage than GOODRICH Plain-Tread, under similar use.

Now observe the differences in Price.

	Goodrich	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"I"	"J"
Retail List Price	\$19.40	\$24.35	\$24.35	\$25.85	\$26.20	\$26.30	\$28.30	\$29.90	\$30.50	\$33.00
Goodrich Valuation.	19.40	19.40	19.40	19.40	19.40	19.40	19.40	19.40	19.40	19.40
Overcharge above "Goodrich Standard" . . .	4.95	4.95	6.45	6.80	6.90	8.90	10.50	11.10	13.60	



SIZE	PLAIN TREAD	SIZE	SAFETY TREAD
30 x 3	\$ 9.00	30 x 3	\$ 9.45
30 x 3 1/2	11.60	30 x 3 1/2	12.20
32 x 3 1/2	13.35	32 x 3 1/2	14.00
33 x 4	19.05	33 x 4	20.00
34 x 4	19.40	34 x 4	20.35
36 x 4 1/2	27.35	36 x 4 1/2	28.70
37 x 5	32.30	37 x 5	33.90
38 x 5 1/2	43.80	38 x 5 1/2	46.00

OBSERVE that the Retail Dealer could "Discount" the above *competing* Tire Price-Lists to the extent of bottom line (on 34 x 4 Plain-Tread) and *still* give LESS intrinsic Value than GOODRICH when sold AT PAR of *its* List-Price.

Similar differences, in **VALUE** apply, of course, on all other Sizes.

Here follows the "Goodrich-Standard" Price-List on some of the popular Sizes. You may safely pin your faith to it as the *Limit of Sure Value*.

* * *

COMPARE these Prices carefully with what you have paid for *other* Tires of *dependable* Make.

Then ask yourself what YOU ought to do about Tires in future.

Compare these Goodrich "Fair-List" prices, showing tremendous reductions with prices you have previously paid.

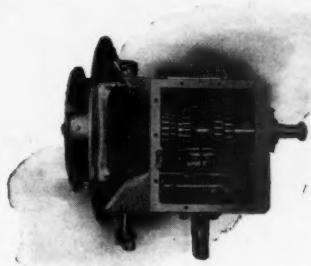
For instance, old prices on Goodrich 34 x 4, Smooth Tread, \$24.35.

Present "Fair-List" price, \$19.40.

Ask your dealer for Users' Net Price List, showing prices on all sizes.

THE B. F. GOODRICH COMPANY
Akron, Ohio

GOODRICH— —FAIR-LISTED TIRES



Differentials Transmissions

FROM a standpoint of efficiency there is no greater asset to a motor car than Brown-Lipe products.

It is very much to the interest of every car owner or prospective car owner to understand just why Brown-Lipe differentials and transmissions represent this highest efficiency.

If you are not thoroughly familiar with the supremacy of Brown-Lipe products ask your dealer to tell you why any other differential or transmission is a compromise. If he cannot tell you or if he will not tell you, write to us and we will convince you beyond a doubt of the justifiable claims we make for supremacy of our products.

If you have not already read our 16-page announcement which ran January 7th in this publication, refer back to it and study it carefully. The information that you get from the study of it will be worth money to you.

Above all else don't compromise efficiency by using other than Brown-Lipe products when it is easy for you to have them.

BROWN-LIPE GEAR CO.
TRANSMISSIONS



SYRACUSE



NEW YORK



CHICAGO



DETROIT

Thos. J. Wezel K. Franklin Peterson L. D. Bolton
29 W. 42nd St. 122 So. Michigan Av. 2215 Dime Savings Bk. Bldg.

DIFFERENTIALS
BROWN-LIPE-CHAPIN CO.





The Service Sheldon Springs

Will Give Is a Known Quantity



The degree of service and safety Sheldon Springs will give is determined before they leave the factory, by a series of the most remarkable tests conducted anywhere in the world. Not one, but many springs out of each shipment are tested to destruction by machines built especially for the purpose, which put the springs through every known kind of test.

With the worst kind of handling on the worst roads, no driver could punish the springs on his own car with half the severity to which Sheldon Springs are subjected in one of these tests.

Service Considered, Sheldon Springs Cost Less

Just because unqualified thoroughness in the beginning, as far back as the first inspection of raw material, is characteristic of every step in the production of Sheldon Springs, and because the actual service Sheldon Springs will give is determined before they are sold, it does not follow that Sheldon Springs are prohibitively ex-

pensive. Our tremendous facilities and specialized skill in the manufacture of automobile springs enables us to quote prices to automobile manufacturers which, in conjunction with the definite service we can guarantee, make Sheldon Springs the most economical to use.

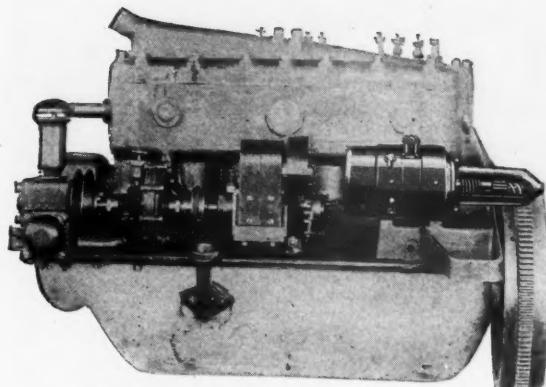
THE SHELDON AXLE AND SPRING COMPANY

MAKERS OF SPRINGS AND AXLES FOR HEAVY DUTY SERVICE FOR MORE THAN 50 YEARS

WILKES-BARRE, PENNSYLVANIA

Chicago: 122 S. Michigan Blvd. San Francisco: 444 Market St. Detroit: 1215 Woodward Ave.

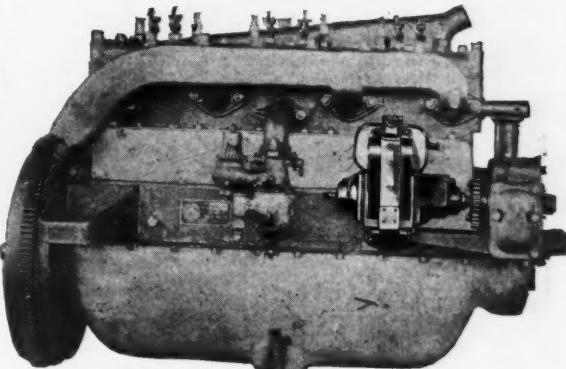
Absolute Reliability



Right side of Overland "Six" motor, showing the simple installation of the AUTO-LITE starting motor.

YOU are never without lights when driving a car equipped with the AUTO-LITE generator. It keeps the battery *always charged*. It is simple in construction and absolutely automatic and self-governing in operation.

THE AUTO-LITE starting motor cranks your engine at a speed of over 125 revolutions per minute, *no matter what the temperature*, insuring perfect cranking conditions in the coldest winter weather. Every time you put your foot on the starting button you get immediate and positive action.



Left side of Overland "Six" motor with the AUTO-LITE Model G. A. generator which operates at 1½ engine speed.

The automobile manufacturer who equips his product with the AUTO-LITE system, spares no expense to give his patrons the most perfect electrical apparatus on the market.

The Electric Auto-Lite Company

Home Office and Factory: Toledo, Ohio

New York

Detroit

Kansas City

San Francisco

Electric Auto-Lite

STARTING - LIGHTING - IGNITION

Polarine
FRICTION REDUCING MOTOR OIL

Makes Winter Driving Safe

Zero weather will not affect the flexibility of your engine if you lubricate with POLARINE. You can use your car on the coldest day without risk of stalling from frozen oil.

Because POLARINE flows freely at zero, maintaining the correct lubricating body at any motor speed or temperature.

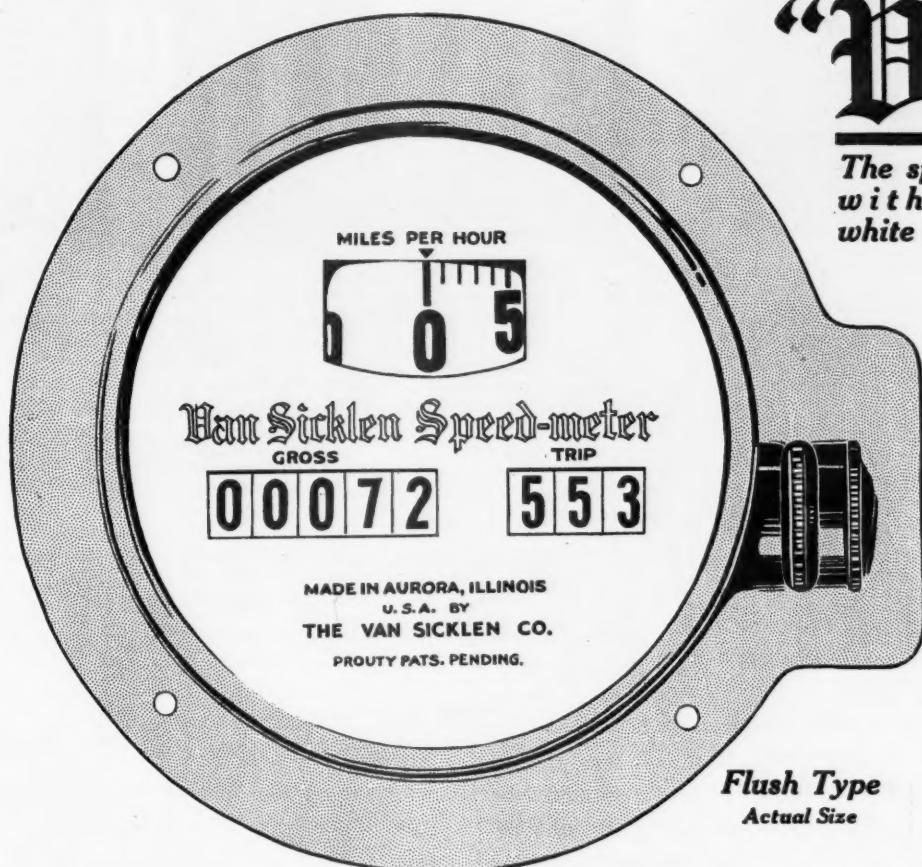
POLARINE minimizes carbon deposits and secures maximum power. It increases efficiency, reduces friction and lengthens the life of your car.

POLARINE is made by the Standard Oil Company, the great service organization on which American motorists depend for reliable motor supplies.

Sold with a guarantee of satisfaction. Known as the *Perfect Summer and Winter Motor Oil.*

STANDARD OIL COMPANY
(AN INDIANA CORPORATION)
CHICAGO

RED CROWN GASOLINE
Car and Money Go Farther



"Van"

*The speed-meter
with the big
white face - -*

*Flush Type
Actual Size*

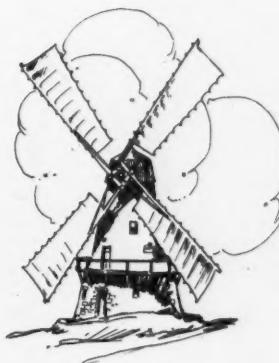
Van works on much the same principle as the Dutch windmill, which uses a current of air to make meal. Only Van uses an air-stream to make miles.

Van's operation is based on the generation and calibration of a STEADY-FLOWING current of air.

An air stream is not affected by engine vibration, or road shocks. Air remains air, under all conditions, and cannot get out of order. Air abhors complication. Air cannot wear out and costs nothing.

These are reasons why Van is so remarkably simple, so infallibly accurate and so very reasonably priced.

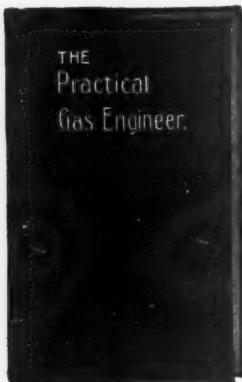
Van comes in two models—Flush Type for cowl-board installation, and Special Bracket Type for Ford cars. Van is fully guaranteed in every particular. Prices and full information on request.



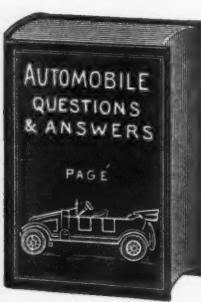
THE VAN SICKLEN COMPANY
AURORA

General Distributors: The Beckley-Ralston Company, Chicago

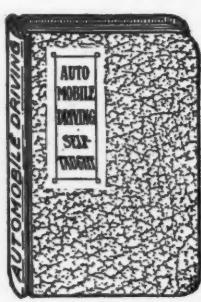
Western Representative, T. T. Roe, 847 Golden Gate Ave., San Francisco, California



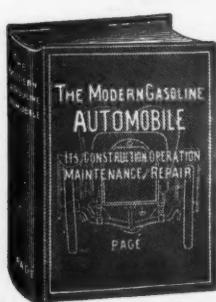
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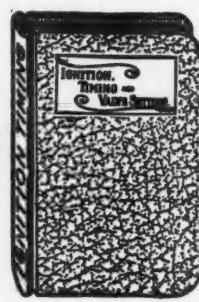
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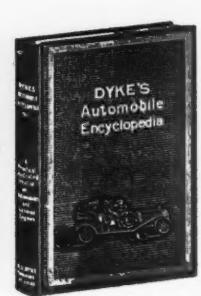
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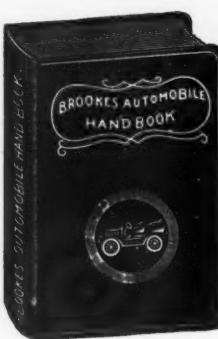
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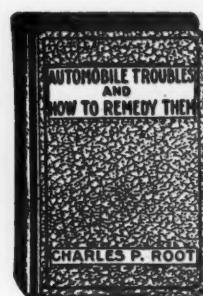
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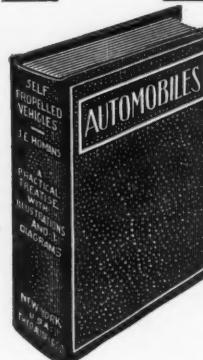
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(1)

Compare
Quality-
Compare
Prices

When you
can buy Firestone
Tires and Tubes at these
prices, you can't afford
to use any other make.

**Firestone Net Price
List to Car-Owners**

	Case Round Tread	Case Non- Skid	Grey Tube	Red Tube
30x3	\$ 9.40	\$10.55	\$2.20	\$2.50
30x3½	11.90	13.35	2.60	2.90
32x3½	13.75	15.40	2.70	3.05
34x4	19.90	22.30	3.90	4.40
34x4½	27.30	30.55	4.80	5.40
36x4½	28.70	32.15	5.00	5.65
37x5	35.55	39.80	5.95	6.70
38x5½	46.00	51.50	6.75	7.55

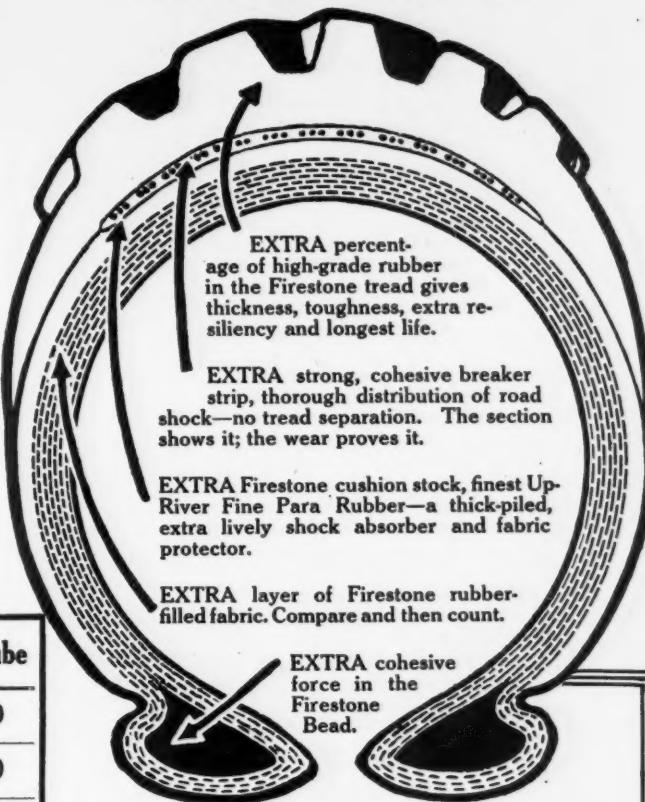
Buy Firestones for Most Miles per Dollar

FIRESTONE TIRE AND RUBBER COMPANY

"America's Largest Exclusive Tire and Rim Makers"

Akron, Ohio—Branches and Dealers Everywhere

**When Choosing Tires
Be Sure to Get These
Inbuilt Extras**



Firestone Tires and Tubes are made by specialists—high quality, low cost.

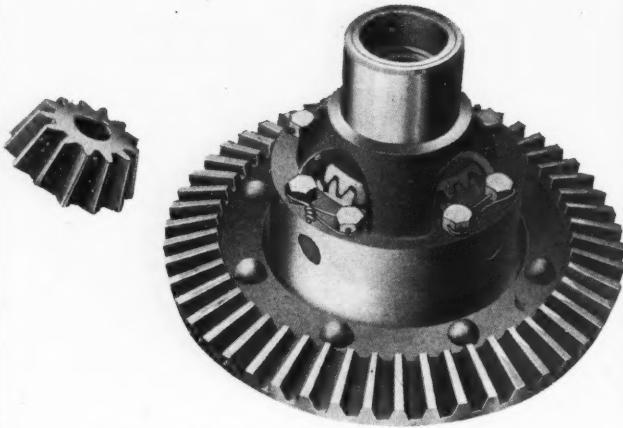
Made in America's largest, most efficient, exclusive tire factory—high quality, low cost.

Delivered to car-owners everywhere through the most complete, efficient, ECONOMICAL distributing system ever established—high quality, low cost.

TIRES and TUBES

WARNER

"THE RECOGNIZED STANDARD"



Warner Model D31 For 15-20 H. P. SAE Cars

We make strong claims of the superiority of Warner Gear Company products, but these claims are all upheld by the service Warner products render.

Warner Differentials

Let the unsurpassed product of a highly efficient organization with fourteen years' experience in differential building solve one of your gear problems.

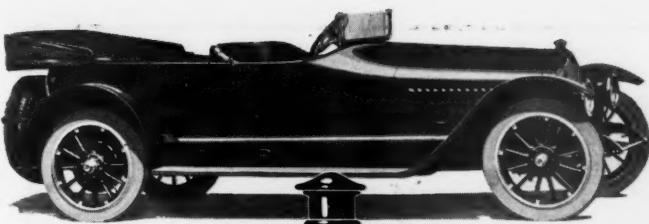
LET WARNER DIFFERENTIALS HELP YOU BUILD A BETTER CAR

DIFFERENTIALS
TRANSMISSIONS
STEERING GEARS
CLUTCHES

WARNER GEAR CO.
MUNCIE, IND.
Detroit Office, Ford Building



MOTORISTS
and
DEALERS
will find the
ANSWER
to the
TIRE
QUESTION
in the
Saturday Evening Post
on Feb. 25th



National

Why Is the National at Indianapolis so Successful?

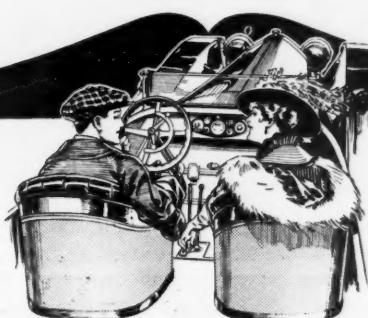
OME will answer that the National's success is due to its years of racing victories, such as International Champion and Stock Car Champion. Others, to beauty and stylish design, manufacturing facilities or the National's financial soundness. These are only partially correct. The real reason for the fifteen years of consistent growth of the National—a steady increase in National car sales year by year (45 per cent in 1914)—is this significant fact:—The National is

In Business to Make Money

Racing—beautiful design—efficient factories—financial stability and everything else are but means to this one end—**TO MAKE MONEY**. This is why *you* as a dealer should become acquainted with the National. Wait a minute—you said just now to yourself perhaps, "Oh, I have seen the car—I know what it looks like—what its specifications are." But have you seen its money-making specifications? Have you talked to the executives who will co-operate with you when you are the National dealer? Have you let them explain why the National has put as much time and work in building BUSINESS as well as MACHINES? This is wherein the National differs from others.

Six \$2375

**National Motor Vehicle Co.
INDIANAPOLIS, INDIANA**



When Writing to Advertisers, Please Mention Motor Age



The Hidden Road:

"Why didn't the fool sound his horn?"

But fool-driving is one of the hazards of motoring—a terrible hazard at a spot like this.

How do you know your brake-lining will hold in an emergency? You cannot tell by looking at the outside of the brakes. It's the **brake lining** that stops the car. Brake lining is the frictional substance between the brake drum and brake band. If it is an inferior quality it quickly wears out—gets hard and dry—loses its friction and the brakes fail to hold the car.

Thermoid HYDRAULIC COMPRESSED Brake Lining—100%

Brake lining to be any good at all must be 100%—must be honest brake lining all through. Not merely on the thin surface outside—not merely a loose and stringy woven lining that is friction shy inside.

Thermoid is forced by hydraulic compression into a solid single substance of uniform density and with 100% friction or gripping power clear through.

It grips even though worn paper thin.

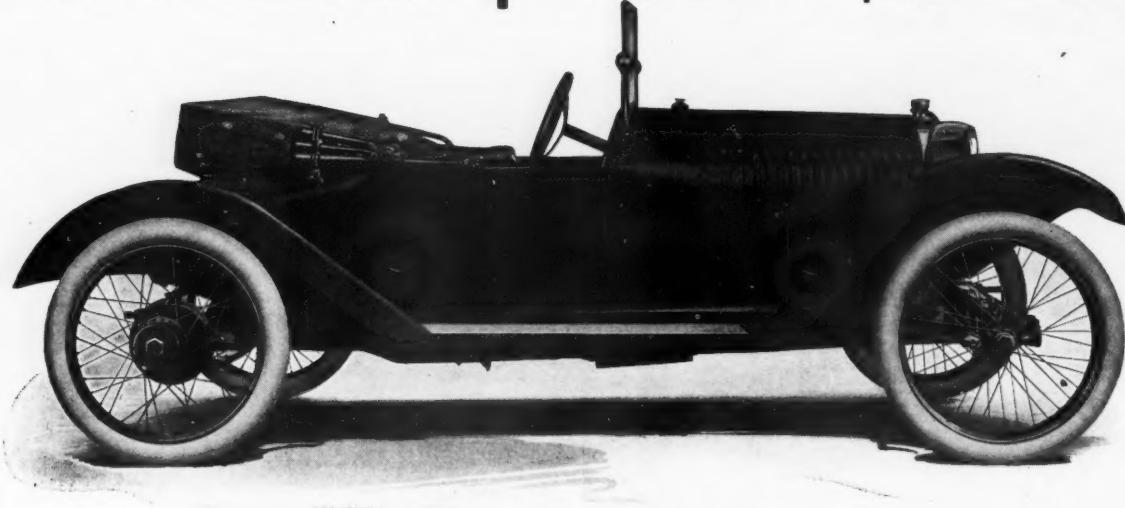


Our Guarantee:
Thermoid will make good—or we will.

Thermoid is trustworthy.
Guard your safety with Thermoid.
Watch Your Brake Lining
THERMOID RUBBER CO.
TRENTON, N. J.

Cornelian \$410

Top and Windshield
\$25 Extra



Standard Tread, 100 Inch Wheel Base

A fifty mile an hour spin in this speedy, easy riding little roadster makes you realize that twelve years' successful manufacturing experience on high grade auto parts with a highly efficient organization has been concentrated upon the production of this snappy little car.

Blood Bros. Machine Company, Allegan, Mich.

THE
Kemco

Two-Unit

ELECTRIC STARTING-LIGHTING
SYSTEM

Can be attached to practically
all cars in service

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D E A L E R S

THE KEMCO

Has **proved** its quality.

Contract with dealers is attractive.
Company gives dealer a good profit.
Sales mean service satisfaction.
Unoccupied territory now being al-
located.

Write for Booklet No. 17
Prices and Discounts

The Kemco Elec. Mfg. Co.

2233 Ashland Rd.
Cleveland, O.

The **AERMORE**
Exhaust Horn

Polite Yet Effective

Can be heard a block or a
mile. It pleases the ear whether
blown low or loud. Just the
horn you want. Here are the
reasons:

Musical Sound—Built on the
principle of a pipe organ. Four
notes, blown at once, produce
perfect harmony.

No Upkeep—First cost is only
cost. Made of brass tubes,
nickel-plated. Nothing to wear
out.

Reliable—Cannot clog. Can-
not be tampered with when car
is standing.

Clears the Way—Amply warns
but does not frighten.

Easy to Put On—Nothing
shows but the foot pedal.

Get it from almost any dealer.
Price \$5.50 to \$7.50 complete. Every
horn guaranteed. Sold direct where
local dealer does not carry it. De-
scriptive folder sent on request.



The Fulton Company
727-729 National Ave., Milwaukee, Wis.

GABRIEL HORN MFG. CO.
1415 E. 40th ST., CLEVELAND, OHIO



Why

subject your car to wear and tear, and its occupants to discomfort by having to slow down at every rough place like this—when you could ride over them in comfort without slackening speed, if your car had

?

GABRIEL SNUBBERS

Supreme Auto Oil

The Ideal Cold Weather Oil

DOES NOT CONGEAL

FLows FREELY AT ZERO



High Viscosity renders Supreme Auto Oil the same efficient lubricant at Zero as it is on a summer day. It burns up cleanly in the combustion chamber, leaving a minimum carbon deposit.

We have an attractive proposition for dealers and garages

Write our nearest office

GULF REFINING COMPANY

DEPT. 1875 FRICK ANNEX

General Sales Offices

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DISTRICT SALES OFFICES

New York Philadelphia Boston Atlanta
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Write for our booklet "Progressive Lubrication"
Sent Free



**Warns
Both
Ear
and
Eye**



TRINITY BELL

**Commands the Road
for Safety**

One man was killed—

An expensive limousine was wrecked—

When the chauffeur drove between street cars, moving in opposite directions, to save the lives of two girls who failed to hear his warning signal.

A Warning Signal That Never Fails

—TRINITY BELL—is essential for safety.

No noise can drown out the TRINITY BELL—a combination of recognized warning signals—the clear-toned bell and red lantern, or ornament.

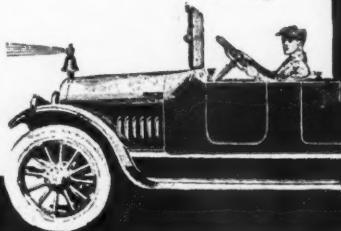
Operated by electric push button. Always in order. Complies with law, and is absolutely guaranteed.

Made in 3 models, \$6, \$10 and \$12. Accept no other warning signal.

Dealers and Jobbers—TRINITY BELL is a bell you can sell. Liberal discounts. Write.

TRINITY BELL ELECTRIC MFG. CO.
5108 Calumet Ave.

Branch Offices: Trinity Bell Sales Co., 11 N. Cascade Ave., Colorado Springs, Colo.; 2028 Parham St., Omaha, Neb.; 519 Downing Bldg., Erie, Pa.; 712 Ford Bldg., Detroit, Mich.



When Writing to Advertisers, Please Mention Motor Age.

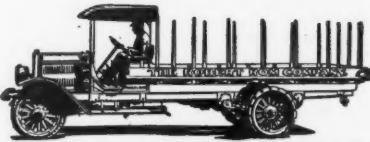
**The
Signal
That
Never
Fails**

HOUK Detachable WIRE WHEELS

"The wheel that makes any car modern"

GEORGE W. HOUK COMPANY
1702 Elmwood Avenue, Buffalo, N. Y.

**Built for
your
business**



In the selection of a Motor Truck, there are three important elements to be considered:

- 1st—Its adaptability to the duty required of it.
- 2nd—The construction and record of the truck.
- 3rd—Permanency and responsibility of the makers.

Each of these essentials is satisfactorily met in KisselKar Trucks. Investigate—ask for illustrated portfolio.

Kissel Motor Car Co., 121 Kissel Ave., Hartford, Wis.

KISSELKAR TRUCKS

**BOSTONSTARTER
For FORD CARS**

¶ Fully Guaranteed. ¶ Does the work. ¶ Cost—a fraction of electric starting cost. ¶ No harm to car; does not interfere with cranking in usual manner. ¶ Releases in case of backfire. ¶ Retards spark automatically before starting. ¶ Time tried success—no experiment. ¶ Be sure you get the BOSTON STARTER. ¶ Ask the Ford dealer or your dealer or write.

Boston Starter, Boston Mass.

OSGOOD AUTOLITE DEFLECTORS

have experienced a tremendous demand. More dealers are desired—also local managers in every city and county to extend distribution. Attractive proposition. Hurry! Ask for particulars.

This glareless glass fits any automobile headlight. Deflects rays without diminishing light. No glare. Avoids accidents. Equally good for city or country driving. Nothing else like it.

Endorsed by Chicago and other municipal authorities where glaring headlights are condemned. Retail \$5 the pair. Money-back guarantee. If your dealer cannot supply you, order direct.

OSGOOD AUTOLITE DEFLECTOR COMPANY
Dept. 12, 404 First National Bank Building CHICAGO



HERZ PLUG

BOUGIE MERCEDES

GUARANTEED ONE YEAR

DOUBLE STONE insulation, PLATINUM-ALLOY Electrodes. FOUR SPARKING POINTS. SELF CLEANING. Price, \$1.50. Order from your dealer or

HERZ & CO., 245 W. 55th St. (Nr. Broadway), New York

KOEHLER ONE TON TRUCK \$750

GREATEST VALUE AT THE PRICE • LOWEST PRICE FOR CAPACITY

Here are brief specifications: Motor 24 h. p. Water cooled, 4 Cycle. Ignition, High tension magneto. Tires 36 in. solid standard removable, also non-skid demountable pneumatic tires optional at extra price. Tread 58 in., Axles 2 in. square, rear 1 1/4 in. front. Transmission proved right by years of use, runs in oil bath.

KOEHLER \$750

ONE TON TRUCK

SEND FOR CATALOGUE

DEALERS How about your city or town—is it Koehlerized, or waiting for someone to reap a harvest from sales? Will it be you, or one of your competitors, who will make it hard for anyone else to sell any other make of truck? The Koehler is a great money-maker for dealers, being the lowest priced ton truck and giving greatest value at any price.

ONE TON TRUCK

OUR TRAVELING REPRESENTATIVES ARE NOW COVERING THE ENTIRE COUNTRY and each has a truck with him. Notify us at once if you are interested, as a representative may now be in your section. You do not want to miss a chance to see this truck. Our complete catalog and selling plan should be in your hands—send for these.

H.J. KOEHLER S. G. CO. 291 Halsey St.
NEWARK, N. J.

KOEHLER ONE TON TRUCK \$750

A Two-cylinder Tire Pump that gives complete satisfaction is the

MANZEL
ENGINE-DRIVEN
TIRE PUMP

\$20 Complete with all fittings, including 15 feet of air hose, pressure gauge, etc. Perfect construction, finest materials, most accurate fitting—in short, a pump that eliminates tire worries and the dangers due to under-inflation. Easily attached to most all cars—no drilling—no machine work.

Manzel Bros. Co., 306 Babcock St., Buffalo, N.Y.
Special pump for Ford cars \$7.50

Prest-O-Lite

(Ready-made Carbide Gas)

For Oxy-Acetylene Welding and Cutting

A big source of profit to garages. Makes enormous savings in repair work. We furnish a thoroughly high grade welding apparatus for \$60. The average user will also need gas cylinders, furnished at additional cost, and a small assortment of welding supplies. Truck at extra cost when desired. Write for details.

THE PREST-O-LITE COMPANY, Inc.
The world's largest makers of dissolved acetylene.
233 Speedway, Indianapolis, Ind.

METZ 66 25⁹⁹
The Quality Car

\$600

Touring Model Equipped Complete

Including:
Gray & Davis Electric Starter and Electric Lights

This new Metz Touring Model is just as interesting to DEALERS as it is to prospective purchasers. It means bigger sales, more customers, and ALL of them satisfied.

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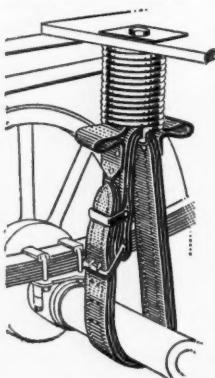
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In ordering, state name and model of car. If your dealer cannot supply you, send direct, charges prepaid, on receipt of price.

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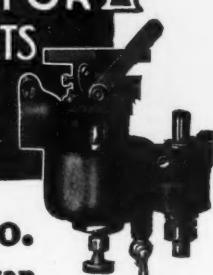


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ONLY ONE ADJUSTMENT

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Detroit Michigan

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Type
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HECD

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"41"
\$3250
132" Wheelbase

"48"
\$5000
145" Wheelbase

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Detroit, Mich.

Continental
Motors

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 Model N, 3 3/4 x 5 Model T, 5 x 5 1/4
 Model C, 3 3/4 x 5 1/4 Model T, 5 1/4 x 5 1/4

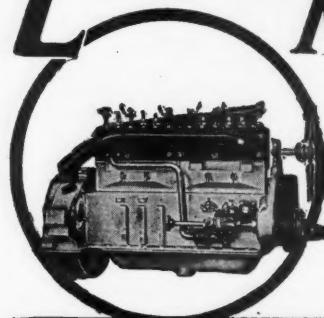
SIXES

Model 6-N, 3 1/4 x 5 Model 6-C
 Model 6-P, 3 3/4 x 5 1/4 4 1/2 x 5 1/4

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Guaranteed for
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Gives a better spark than the magneto at highest attainable speeds.

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Each section 2" wide $\frac{1}{8}$ " thick. They hook to rim. As flexible as ever. Anti-skid, can't blow out or rim cut.

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Try 2 or 3 sections over any old blowout

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\$3.85—Ready to Attach

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World's First Maker of Sixes Exclusively

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1915

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Send for special price list of Speedometer Parts.
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Exclusive Sales Representatives for Manufacturers who supplied Motors, Axles, Wheels, Transmissions, Steering Columns, Control Levers, etc., etc., to the

American Motors Company
Write for prices on parts needed in connection with American cars.

V. A. LONGAKER COMPANY
INDIANAPOLIS, IND.

ATLAS REPAIR PARTS
We have purchased the jigs, tools, drawings of the Atlas Motor Car Co. and are the only concern supplying these parts. Write us, giving model and number. Parts shipped immediately.

Auto Parts & Repair Co., Springfield, Mass.

Another One

ABBOTT-DETROIT

We got repair parts, complete stock, all models Purchased direct from E. F. Gerber

Now on sale at the Big Shop, where repair parts for all cars are always to be had. Get our prices and we both make money.

PURITAN MACHINE COMPANY

415 Lafayette Blvd. Detroit, Mich.

All Parts for All Cars

AT BARGAIN PRICES

Send for our monthly bargain list on new and used dynamos, lamps and electric equipment for automobiles and boats.

THE ESTERLINE CO.

223 E. South St., Indianapolis, Indiana

Auto Lamps With the Enamel Looking Old and Chipped

Can be made to look like new with one coat of Peerless Lamp Enamel. Made to dry with gloss or dull finish. Ask your dealer.

THE COLUMBUS VARNISH COMPANY

Columbus, Ohio

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MICHIGAN, MORA AND DRAGON PARTS IN STOCK

We maintain a complete stock of parts for the above cars.

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67 Laurel Street, Philadelphia, Pa.

AUTOMOBILES, BODIES AND PARTS

New and second hand for many makes of cars for sale cheap. Write us when in need of parts.

GEO. SCHMITZ & BROS.
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Automobile Seats and Cushions

of leather are made to look like new with one coat of Peerless Cushion Dressing, that does not crack, wash or rub off. Ask your dealer.

THE COLUMBUS VARNISH COMPANY

Columbus, Ohio

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Do you know that a set of

GLOBE SEAT COVERS

on your car will improve the looks 25%, save your clothes and protect the upholstery? Our direct-to-owner plan will save you money. Write for prices and samples of material.

Don't wait—do it now

GLOBE SEAT COVER COMPANY
BOX 75—RACINE, Wis.

Auto Parts (Any Make) at Cut Prices

First quality piston rings, 25 cents.
Triple piston rings (save expense of cylinder reborning), 90 cents each.

Grossman Auto Parts Co., White Plains, N. Y.

AUTO SALVAGE COMPANY

1436 Wabash Ave., Chicago, Ill.
Model K Winton parts. D4 Bosch magneto, \$35. Type 10 Buick parts. Pope-Toledo parts for sale. 9K Stoddard-Dayton motor, \$100. 50 H.P. Royal Tourist motor, \$75.00. Prest-O-Lite tanks, \$9.00 each. DR4 Bosch Magneto, \$35.00. 6-Cyl. dual Bosch Magneto, \$50.00. 35 H.P. Continental motor, \$100. 4 speed sel. trans. with enclosed clutch, \$60.00. 2-Cyl. opposed Davis motor, \$40.00.

AUTO TOPS AND RACING SEATS
Mohair Tops for runabouts, \$20.00; Mohair Tops for touring cars, \$30.00; Racing Seats, per pair, \$18.00. **AMERICAN AUTO TOP MFG. CO.**, 1451 W. Washington Blvd., Chicago, Ill.

Bodies, Motors and Parts

Upholstered Bodies

1 4-Passenger Croxton Taxicab body, upholstered and painted.....	\$200.00
5-Passenger Marlon body, upholstered.....	70.00
5-Passenger Henderson body, upholstered.....	65.00
7-Passenger Midland body, upholstered.....	70.00
2-Passenger American Roadster body, upholstered.....	50.00
Unupholstered.....	15.00
1 Croxton 4-passenger body, unupholstered.....	12.00
1 7-passenger second-hand Croxton body.....	30.00
300 Marion 5-passenger bodies, stream line, unupholstered.....	10.00
1 Croxton Roadster body, unupholstered.....	10.00
1 5-Passenger body, upholstered and painted.....	65.00
1 Croxton Roadster body, upholstered, second-hand.....	30.00
1 Delivery wagon body, suitable for a Ford, painted red, wood sides and top.....	40.00
10 American underslung bodies, 4-passenger, upholstered and painted.....	60.00
1 7-Passenger Midland body, upholstered.....	80.00

Motors

1 4-Cyl. Marathon motor unit power plant with clutch, transmission, joint, fan.....	125.00
50 H. P. Model gas engine motor complete with governor, carburetor, magneto and coil.....	200.00
2-Cyl. opposed motor with magneto.....	60.00
6-Cyl. Maxwell motor.....	200.00
4-Cyl. A. C. Knox motor.....	60.00
4-Cyl. Continental motor.....	75.00
4-Cyl. Buda motor slightly used.....	100.00
1 2-Cyl. Beaver motor with carburetor, timer, coil.....	40.00
1 2-Cyl. 2 cycle motor, new.....	35.00
1 4-Cyl. Marion A. C. motor, second-hand.....	60.00
1 3-Cyl. 2 cycle A. C. motor.....	35.00
100 Sets Firestone demountable wheels with rims, per set.....	20.00
1 Set wire wheels 34x4, per set.....	50.00
Ward-Leonard starters.....	20.00
Elsemann 4-cyl. magnetos with coil.....	35.00
Elsemann 6 cyl. magnetos with coil.....	45.00
Splitdorf magnetos with coils, slightly used.....	12.00
Gibney Elec-Trick Vulcanizer.....	3.00
Mufflers, any size.....	2.00
One-ton Ross truck steering gears.....	10.00
Barnes locking steering devices.....	10.00
Nickel steel valve stems 2 1/4" head, machined.....	.20
Gemmer steering gears, 18" wheel.....	15.00
Carbide generators, new.....	.75
Piston rings, from 3" to 5", each.....	.25
Jackson radiators, honey comb type.....	12.00
200 Assorted radiators, odd shapes and styles, each.....	10.00
Roadster fenders, per pair.....	10.00
Touring car fenders to fit most any car, per pair.....	10.00
American oval gasoline tanks.....	10.00

AUTO PARTS CO.

DEPT. O.

737-739 Jackson Blvd.

CHICAGO

The Clearing House—continued.

Auction

Commencing Wednesday, February 17, 1915, and continuing until sold (which it is expected to take not more than two days), we will sell at public auction the entire plant of the

American Voiturette Company Manufacturers of the famous Keeton and Car-Nations Automobiles Bankrupt, located at Lawton and Buchanan Sts., Detroit, Mich.

We will start the sale promptly at 10 o'clock the first day on the Good Will of the bankrupt concern, said Good Will consisting of the right to use the name, list of car owners, blue prints, etc.

After sale of the Good Will, we will proceed and sell over \$300,000.00 worth of

Machinery, Tools, Standard Parts, Supplies, Accessories, Material, Hardware, Paints, Entire Trimming Shop, etc.

At 2 o'clock Thursday, February 18th, we will offer for sale the Automobiles, of which there are at present 60 7-Passenger and Roadster style "Keetons" and 350 4-Passenger and Roadster style Car-Nations. However, owing to the demand for both the "Keeton" and Car-Nation cars we are unable to state just how many will be on hand at time of sale.

No catalogs of this sale are being issued, and we advise all prospective purchasers to take advantage of the inspection period which starts Saturday, February 13th.

The entire plant will be sold in lots only and not in bulk. Sale will be made for cash. A deposit of 25% is required from each purchaser. No cheques accepted unless certified.

All questions answered at the undersigned auctioneer's office.

Samuel L. Winternitz & Company, Room 506 Rector Building, 79 W. Monroe St., Chicago, Ill.

Please bear in mind that this sale takes place in Detroit.

AUTO TOPS BUILT and REPAIRED
Seat covers and body building, remodeling and
trimming. Write for prices.
BITELY TOP & BODY CO.
1342-4 W. Jackson Blvd. Chicago, Ill.

BATTERIES
New and used factory prices. Give size and
state if for ignition or lighting in first letter.
Spark plugs $\frac{1}{4}$ " at \$2.00 a dozen.
The Ampvo Battery Co.
3031 Michigan Ave. Chicago, Ill.

BALL BEARINGS REGROUND
We guarantee them as
GOOD AS NEW
All sizes and makes in stock ready for immediate delivery—At prices that will interest you.
AHLBERG BEARING CO.
2640 Michigan Ave., Chicago, 1790 Broadway,
New York, 805 Woodward Ave., Detroit, 98
Massachusetts Ave., Boston, 1841 Euclid Ave.,
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COMMERCIAL BODIES
For FORD CARS—14 STYLES
Painted or in Primer
Reduced Prices on flare board and
screen panel bodies to fit Poss cars
Motor Truck Bodies and Cab Tops
FAYETTE S. PROUTY
618 Second Ave. Detroit, Mich.

Croxton, Michigan, F. A. L., Elmore,
Deal, Midland, American, Henderson,
Repair Parts Furnished. We also build
and repair radiators, cylinders, crank
shafts, etc.

Department O
AUTO PARTS COMPANY
737-39 W. Jackson Blvd., Chicago, Ill.

CLEAN UP SALE

5-pass. fore-door, stream line bodies,
upholstered and painted, all sizes and
styles in stock, \$55.00 to \$85.00.

Model T Ford Delivery Bodies with
top and upholstered seat, carrying space
57" x 40", clearance under top 54", \$75.00.

Model T Ford Open Dely. body, flare
side, boards, upholstered seat, finished,
\$50.00.

E. M. F. Fenders, black enamelled—
per pair, \$4.50; per set, \$8.00.

Spark Plugs— Each 4 for
Fire Fly, $\frac{7}{8}$ -18 size only... \$0.25 \$1.00

Auburn $\frac{1}{2}$ " size only..... 25 1.00

Garage Assortment

1,000 asst. copper gaskets, all the
popular sizes in round and flange
types \$ 3.00

100 pounds asst. U. S. Std. and
S. A. E. cap screws, nuts and
bolts, clevis pins, wood screws,
etc., etc..... per box 6.00

60 pounds asst. rod ends, spring
clips, spring shackle links, adj.
yoke ends, plain yoke ends, timer
and carburetor levers, clevis
pins, etc., etc..... 3.50

Ford Model "T" radiators..... 16.00

High grade cylinder oil, 100 bbls. in
the lot, while they last... per gal .16
Sold in barrel lots only, about 50 gal.
in bbl.

THE M. & M. COMPANY
480-500 Prospect Ave. Cleveland, O.
Do you want our catalogue? It's yours
for the asking.

Cocos and Carpet Mats, Hand Made Seat
Covers, Auto Tops Built and Repaired.

AUTO CAPE TOP CO.
2334 Michigan Ave. Chicago, Ill.

CUT PRICES
Send for our illustrated cut price auto supply
catalogue.

Liberty Tire & Supply Co.
98 Chambers St. New York, N. Y.

Dirty Looking Cylinders and Rusty Engine Parts

should be coated with Peerless Cylinder Enamel.
Solid Covering one coat. Made in Black and
Gray. Ask your dealer.

THE COLUMBUS VARNISH COMPANY
Columbus, Ohio

F. & H. WIRE WHEELS

Equipped with F. & H. Special Wire
Wheel Rims. Adaptable to any car.
Complete equipment for Ford cars.

THE F. & H. WIRE WHEEL CO.
Springfield, O.

Do Your Fenders Look Like New?

With one coat over the metal or old enamel you
can have a rich gloss enamel finish with Peer-
less Jet Black Fender Japan. Ask your dealer.

THE COLUMBUS VARNISH COMPANY
Columbus, Ohio

The Clearing House—continued.

Automobile Supplies and Equipment

Harris Brothers Company offer an unusual opportunity to Automobiles, Garages, Dealers and the public at large to purchase bargains in accessories, complete cars, machinery, factory equipment, office furniture and supplies in general.

AUTOMOBILE MATERIAL—Port Huron, Mich., Indianapolis, Ind., Detroit, Mich., Pontiac, Mich.

MACHINERY—All Kinds—Chelsea, Mich.

SUPPLIES—All Kinds—Chicago, Ill.

At Port Huron, Michigan

In the matter of the Havers Motor Car Co., bankrupt, at Port Huron, Michigan, our Company has been appointed Special Liquidators for the Trustee, acting under authority of the Referee in Bankruptcy.

This material includes cars, accessories, motors, transmissions, radiators, bodies, fenders, Firestone rims and everything in general that entered into the construction of the Havers car, machine tools, hand tools, cranes, fire extinguisher apparatus, vices, office furniture, files, typewriters, adding machines, etc., etc.

At Detroit, Michigan

Complete stock of high grade machine tools, equipment and automobile accessories.

At Chicago, Illinois

The largest stock in the world of high grade machinery, tools, equipment, building material and supplies in general.

At Indianapolis, Indiana

We are closing out an enormous quantity of automobiles, automobile parts, bodies, rear axles, front axles, frames, upholstering material and complete equipment to build automobiles, machinery, hand tools, raw stock and general supplies, office furniture, etc., etc.

At Pontiac, Michigan

We have several complete six-cylinder chassis, besides frames, self-starters, transmissions, rear axles, radiators, machinery and equipment.

Catalogs Free

If interested in any part of the above stocks, catalogs and literature concerning same will be promptly mailed you.

A complete book is issued of our general stock, but we are at the present conducting Special Sales on the material at Port Huron, Indianapolis and Pontiac. At each point we have a Special Representative prepared to close sales.

FOR FULL INFORMATION ADDRESS

HARRIS BROTHERS COMPANY

DETROIT, MICHIGAN or
PORT HURON, MICH. or
INDIANAPOLIS, IND. or
CHICAGO, ILLINOIS

Eureka Diamond Honeycomb Radiator

"Will out-live your car" All radiating surfaces—no fins—one of the most efficient coolers made. Very strong and handsome. Built in any size or design. New cores put in any radiator. Also Repairing. Absolute satisfaction guaranteed.

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FORD CAR BODIES

Commercial bodies guaranteed to fit Model "T" Ford. Bucket seats not painted or trimmed, \$5.00 per pair. Trimmed and upholstered backs and cushions, \$15.00 per pair. We also build a full line of Speedster bodies complete; also Ambulance and Undertakers' cars, all for Ford chassis. Send for our catalog. Agents wanted everywhere.

COLUMBIA BODY CO. OF DETROIT
21-23 Seldon Ave. Detroit, Mich.

Ford Cut-outs—Ford cut-outs with brass lock open pedal, complete, \$1.15; with enameled pedal, \$1.00.

Brass Hammers—Polished brass hammer with handle weight 1 lb., price \$0.65

Brass for Bushings—Cored brass for bushings, all sizes. Write for prices.

Lincoln Machine Shops, Lincoln, Ill.

Ford Connecting Rod Bearings

Of high grade bearing metal, perfect fit guaranteed. Dealers, write for agency proposition.

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FORE DOORS

You can get complete doors and panels from us. Get busy and modernize your car. We have all patterns. We also make racing seats, bodies.

CHICAGO AUTO BODY CO. 1627 Michigan Ave. Chicago, Ill.

Ford Flare Board Bodies

for mounting on rear of roadster body. Sizes 31 wide by 46 in. long, 10 inches high, \$25.00. F. O. B. Detroit. Size 31x60x10, \$28.00 F. O. B. Detroit. Bodies are strong and light, hinged tail gate. Painted black rear lamp bracket and iron furnished, making it quickly interchangeable with turtle back.

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New 5x6 four-cylinder, governor-controlled engine, fully equipped, with carburetor, magneto. Will sell for much less than cost. **FRED HANSON**, 570 Prior Ave., St. Paul, Minn.

FOR SALE

A small number of modern, well designed and constructed six, five and four-passenger touring bodies and comfortable roadsters painted and trimmed. Will change and guarantee to fit your car. Write us.

IRVIN ROBBINS & CO.
Industrial Building, Tenth and Canal
Indianapolis, Ind.

Guaranteed New Radiators

You need a strong, well built radiator these winter days.

HONEYCOMB RADIATORS

Ford T.	\$25.00
Hupp	25.00
Buick 10, 24, 25, 34, 35, 36	27.50
Buick 16, 17, 19, 26, 27, 28	37.50
Buick 21, 38, 39, 43	37.50

FIN AND TUBE RADIATORS

Ford T.	\$20.00
Buick 10	25.00
Buick 24, 25, 34, 35, 36, B24, 25	22.50
Buick 16, 17, 38, 39	31.00
Buick 19, 27, 28, 43	28.00
Buick 21	30.00

Will ship on telegram same day C. O. D.

Detroit Radiator & Specialty Co.
963 Woodward Ave. Detroit, Mich.

GARAGE OWNERS

There are good profits to be made handling our line of Ford Delivery Bodies; twenty styles to select from; write us for list and discounts.

WE ARE FORD COMMERCIAL CAR AGENTS

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We have on hand repair parts for Lozier Cars at reduced prices. Bring old parts for replacement.

Philadelphia Machine Works
67-71 Laurel St., Phila.

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We can ship immediately every part for every Michigan car, no matter what the model.

We purchased and are successors to the Michigan Motor Car Co. and have sole access to all patterns and engineering data.

Every part guaranteed to be accurate. Shipping same day order is received.

MICHIGAN MOTOR CAR PARTS CO.
Successors to Michigan Motor Car Co.
KALAMAZOO, MICH.

The Clearing House—continued.

GUARANTEED RADIATORS

Not always necessary to buy new radiators. New cores can be furnished for frozen or damaged radiators. We build the fin and tube type. Guaranteed copper fins and tube.

We also repair and furnish new cores for May radiator.

We build new cores for all makes and for all cars. Get our prices. You will save money.

Cores in stock for many standard radiators such as Hupps, Warrens, Herreshoffs, Buicks, E. M. F. 30, Studebaker, Hudson 20, Cadillacs and several others.

We can build and fit a new core in your radiator in two days—if in stock, in one day.

Write for bargain sheet of accessories.

HURON RADIATOR & LAMP CO.
253-255 Jefferson Ave., Detroit, Mich.
Terms, cash with the order.

MAXWELL OWNERS AND REPAIRMEN

Why pay 20% advance for your repair parts for the old models of MAXWELL cars? We can supply 90% of your wants at the old list price. Transmission gears and parts in stock for Cadillac, Case, Croxton, Dorris, Elmore, Moline, Moyer, Overland, Regal, Selden, Stoddard, Velle and 75 others at cut prices. Why pay more? Send for price list.

M. P. SUPPLY COMPANY
Atlanta, Georgia

MORE SPEED FOR THE FORD

Special ratio Differential Gears for the Racy Type Ford.

2½-1 ratio.....\$15.00 Set
3—1 ratio.....15.00 Set

Absolutely interchangeable with the present gearing

DETROIT RADIATOR & SPECIALTY CO.
963 Woodward Ave. Detroit, Mich.

NEW FORD BODIES

Brand new Ford touring car bodies, \$75
Brand new Ford roadster bodies, \$45

F. o. b. Chicago. Fully guaranteed.

Charge for crating, \$10.00

ERWIN GREER & CO.
1515 Wabash Ave. Chicago

NICKEL PLATING

Send us small parts of your automobile by parcel post and we will re-nickel them. Price 10c to \$1.00.

C. L. FLACCUS GLASS CO., Tarentum, Pa.

NICKEL PLATING

Auto parts replated. Carburetors, radiators and lamps made like new. High grade work at low prices.

M. L. UDWIN CO.
550 W. Van Buren St. Chicago, Ill.
Telephone Harrison 4848

Paint Your Car Yourself
Save \$25 to \$75 by doing the work at home with the Arsenal system. Our big free booklet, "The Car Beautiful," tells how. Send for it today.

Arsenal Varnish Company
Auto Dept. Rock Island, Ill.

OVERLAND BODIES

Model 79 Overland touring bodies complete with top and wind shield, brand new.

\$150 Each

Overland Motor Company
2426-2428 Michigan Ave.
Chicago, Ill.

Prest-O-Lite Gas Tanks B. \$10.50, Black and Nickel Windshields, \$6, Ford Gas and Electric Head Lamps, \$3.25 pair, Spark Plugs, \$0.25. One-third with orders.

BENEDICT, 63 Winder St., Detroit, Mich.

PRICE WRECKERS

Our new Price Wrecker (catalogue) just printed quotes dealers' prices on all accessories, motors, transmissions, tops, bodies, windshields, etc. Sent free on request.

A FEW OF OUR BARGAINS

New Herschel-Spillman Motors, 4 and 6 cylinder, \$275.00; other motors, \$65.00 up. \$300 fore-door touring bodies now \$85.00. Runabout bodies—1914 Ford, new, \$35.00; others \$40.00 and \$50.00. Runabout tops \$15.00. Touring \$25.00 (measurement blank sent on request); Racing Seats \$10.00 each. Spicer Universal Joints \$4.00 each; mechanical oilers \$4.00 up; windshields \$5.00 up; special nickel 1 piece Rainvision shield \$10.00; Disco self-starter \$5.00. Remy complete dual system magnetos, Model R. L. and R. D., \$25.00; others \$5.00 up; Rayfield, Stromberg and Schebler carburetors \$5.00 up; gloves \$1.00 up. Racoons Fur Coats (special bargain) \$18.00; double plush robes \$3.50 each. Bulb horns 75c; electric horns complete with wire and button \$1.95; hand horns (mechanical) \$1.50; exhaust horns (all sizes) \$2.50; spark plug pumps \$5.00; double action pumps \$1.75.

SPARK PLUGS

Special 5 for \$1.00, Mosler 4 for \$1.00, Timesco 3 for \$1.00; Bearings all \$1.00 up to \$5.00.

SPRING SHOCK ABSORBERS

\$12.50 buys the latest in spring shock absorbers, equal to the highest grade on the market, selling at \$35.00. Easy to install. On all good cars as regular equipment.

Hartford-Mondex shock absorbers, \$5.00 each. Rims, detachable or demountable, \$2.50 and \$3.00 each; all makes and sizes. Storage batteries, \$6.00; tool boxes, \$1.00 and \$2.00; rain-coats, \$1.90; rubber "slip-on" shirts, \$2.50; clocks, \$1.00 up; gas tanks, \$2.50; Prest-O-Lite (genuine) tanks, style B, \$12.50 (complete).

LAMPS

Side, oil, \$3.00 pair; side, electric, \$2.00 pair; tall oil or electric, \$1.15; gas headlights, \$5.00 pair (large); electric headlights (large), \$7.00 pair; Gray & Davis large swivel searchlights, \$9.00 each.

RADIATORS

ALL MAKES, at less than 1/2 price. Buick "10," \$19.75; Buick 16/17, \$36.00; Hudson "20," \$29.00; Hudson "33," \$29.00, new. Many others. Radiators repaired or traded in.

FORDS

exhaust horns, \$1.65; electric headlights, \$6.00 pair (Gray & Davis). Special Ford Holley carburetor, \$8.50. Set of 4 inclosed spring shock absorbers, \$7.50; master vibrators \$3.25-\$4-\$5.50. Automobiles and trucks, new and used. WAR PRICES. Send for special list and say what type you are interested in.

TIMES SQUARE AUTOMOBILE COMPANY

(Largest Dealers in the World)
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RACING SEATS

High, narrow back, very comfortable. Upholstered in high grade leather. Black, red, brown or any Spanish color. Special price, \$25.00. CHICAGO AUTO EQUIPMENT CO., 319 So. Jefferson St., Chicago, Ill. Phone Wabash 7244.

Remember

We are the original repair parts factory. We furnish repair parts for over fifty-three models of cars, such as Warren, Elmore, Marquette, Rainier, Welch-Detroit, Welch-Pontiac, F. A. L., Reliable Dayton, Barnes, DeLuxe, Demot, Michigan, Cutting, Northern, Queen, Wayne, Crow, Anhut, Herreshoff, Henderson, and many others. If you want any part for any auto, write us.

Specials This Week

TOPS

Cadillac tops, mohair, complete.....	\$22.00
E. M. F. Roadster.....	10.00
E. M. F. Touring Car.....	15.00
Chalmers 26.....	22.00
Hup 20 Roadster, used.....	6.00
Maxwell Model 25.....	12.00
Buick Model 10 Touring Car.....	10.00
Palje Tops.....	12.00
Model T Ford, complete with curtains and top boot.....	18.00
(And many others)	

RADIATORS

Ford T Honeycomb—guaranteed new.....	\$19.50
Ford T Honeycomb—V-shaped—guaranteed new.....	24.50
E. M. F.—all models.....	27.50
Oakland 42—V-shaped.....	30.00
Oakland 33-40-25.....	27.50
Hudson 20 Honeycomb.....	28.50
Buicks, all models—guaranteed new.....	
Get our prices.	

REAR AND FRONT AXLES

6 Floating Weston-Mott.....	\$25.00
Full Floating Sheldon Axles.....	50.00
Full Floating Lewis and Weston-Mott.....	75.00
McCue.....	50.00
E. M. F. 30 Rear Axles with Transmissions.....	65.00
Front Axles, all styles.....	10.00

MAGNETOS AND COILS

4 cyl. Splitdorf kick switch coils.....	\$8.00
4 cyl. Remy coils, Models S-T-RL and RD.....	6.00
4 cyl. Briggs coils.....	6.00
Splitdorf Tubular Coils.....	6.00
4 cyl. Remy, Splitdorf, Briggs, Heinze and Pittsfield Magnets, each.....	10.00
4 cyl. EU 4 Eisemann High Tension.....	25.00
4 cyl. High Tension Volta Magnets.....	15.00

SPARK PLUGS

Guaranteed regular 75c kind, 1/4" Standard, 3/8" A. L. A. M., while they last.....	\$6 for \$1.00
1/2 Champion X, 39c each.....	4 for \$1.25
Motorcycle plugs, Metric, 25c each, 4 for .80c	

CARBURETORS

1 1/4" Model G Rayfield.....	\$10.50
Model O Schebler, 1 1/4".....	5.19
1" Kingston for Fords.....	3.00
1 1/4" Kingston.....	3.95

FOSTER SHOCK ABSORBERS

Complete with fixtures. Set of four, \$4.00

REAL BARGAINS

11" Bullet Electric Headlamps, per pair.....	\$6.50
Electric Tail Lamps.....	1.25
Electric Bullet side lamps, per pair.....	3.00
Wheels—all sizes.....	3.00
Hand operated Horns.....	4.25
Clear Vision Windshields.....	7.90
Thermos bottles.....	1.45
Deaco Generators.....	18.50

FORD GEARS AND WHEELS

Special 2 1/2 to 1 and 3 to 1 Differential Gears, per set.....	\$15.00
Complete set of 4 30x3 1/2 Demountable Wheels and 5 rims for your Ford, complete with Rim Brace, etc., complete set.....	22.00
Write for bulletins.	

Puritan Machine Co.

Alfred O. Dunk, Pres.
410 Lafayette Blvd. Detroit, Mich.

The Clearing House—continued.

RACING BODIES

Bucket Seats
Ford Delivery Bodies

AUTO REMODELING CO.
1501-5 Michigan Avenue Chicago, Ill.

RADIATORS

NEW GUARANTEED

	Tubular. Honeycomb.	
Ford T	\$17.00	\$19.50
Buick 10	19.75	22.50
Hudsons, 20-33	29.00	29.00
Overlands	31.00	33.00

We have radiators, both tubular and honeycomb, to fit any car. Write us for prices before buying. Send in your old radiator for repairs. We are experts. We'll make allowances on your old radiator.

WORLD'S LARGEST DEALERS

in automobiles and accessories. Send for the great

PRICE WRECKER

the money saver, covering everything pertaining to an auto.

TIMES SQUARE AUTO CO.

56th and Broadway New York
1210 Michigan Ave. Chicago, Ill.

The Acme Cylinder Grinder

in combination with the Engine Lathe possesses all the features of the high priced manufacturing grinders. Only lathe attachment on the market that can grind en bloc cylinders without rotating them. For prices and particulars, write

Robinson, Cary & Sands Co.
St. Paul, Minn.

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Ford Model T Tubular.....	\$16.00
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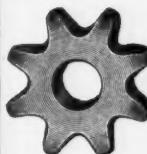
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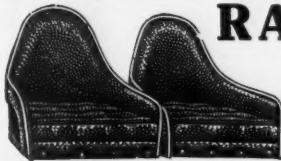


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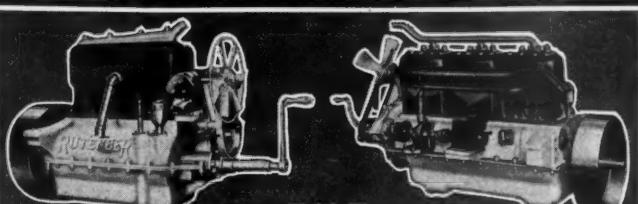
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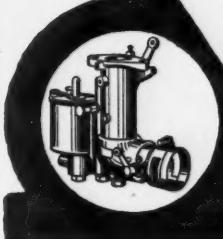
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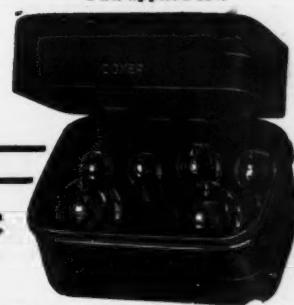
Index to the

Atwater Kent Manufacturing Works	57
Auto Parts Company	85
Bearings Company of America	72
Blood Bros. Machine Company	68
Bosch Magneto Company	76
Boston Starter	70
Braender Rubber and Tire Company	77
Brierton Manufacturing Company	77
Bridgeport Brass Company	73
Briggs-Detroiter Company	76
Briscoe Motor Company	cover
Brown Company	85
Brown-Lipe-Chapin Company	59
Class Journal Company	64
Clearing House	78 to 85
Connecticut Telephone & Electric Company	75
Continental Motor Manufacturing Company	74
Corcoran Lamp Company	72
Cullinan Wheel Company	85
Dayton Rubber Manufacturing Company	76
Disco Electric Starter Company	76
Dodge Brothers	55
Dover Stamping and Manufacturing Company	87
Dyneto Electric Company	52
Eisemann Magneto Company	56
Electric Auto-Lite Company	61
Fedders Manufacturing Company	77
Firestone Tire and Rubber Company	65
Fisher Electrical Works	85
Ford Motor Company	74
Fulton Company	68
Gabriel Horn Manufacturing Company	69
Garford Manufacturing Company	76
General Motors Truck Company	53
Goodrich, B. F., Company	58
Gould Storage Battery Company	cover
Gramm-Bernstein Company	72
Greenslade Oil Company	85
Grossman, Emil, Manufacturing Company, Inc.	74
Gulf Refining Company	69
Heinze Electric Company	73
Herz and Company	71
Holley Brothers Company	72
Hoover, W. H., Company	72
Houk, George W., Company	70
Hyatt Roller Bearing Company	74
Inter-State Motor Company	76
Jeffery, Thomas B., Company	2
Johns, H. W.,-Manville Company	1
K. W. Ignition Company	86
Kemco Electric Manufacturing Company	68
Kimball Tire Case Company	76
Kissel Motor Car Company	70
Kokomo Electric Company	75
Koehler, H. J., S. G. Company	71
Leece-Neville Company	75
Lexington-Howard Company	73

Advertisements

Manzel Brothers Company.....	71
Master Carburetor Corporation.....	73
Mayo Manufacturing Company.....	72
Metz Company.....	71
Miller Rubber Company.....	66
Moline Automobile Company.....	50
Mutty, L. J., Company.....	75
National Can Company.....	73
National Motor Vehicle Company.....	67
New Departure Manufacturing Company.....	88
New York and New Jersey Lubricant Company	75
Nordyke and Marmon Company.....	73
Oakes Company.....	77
Olds Motor Works.....	48
Osgood Auto-Lite Company.....	70
Packard Electric Company.....	54
Parish and Bingham Company.....	85
Paro, H. G.....	75
Pennsylvania Rubber Company.....	74
Perkins-Campbell Company.....	73
Pittsburgh Model Engine Company.....	77
Prest-O-Lite Company.....	71
Rajah Auto Supply Company.....	75
Remy Electric Company.....	back cover
Republic Motor Truck Company.....	86
Republic Rubber Company.....	72
Royal Equipment Company.....	77
Rutenber Motor Company.....	85
Salisbury Wheel and Manufacturing Company.....	73
Schrader's, A., Son, Incorporated.....	76
Scripps-Booth Company.....	47
Searchlight Company.....	74
Shaler, C. A., Company.....	74
Sheldon Axle & Spring Company.....	60
Sparks-Withington Company.....	75
Sphinx Motor Car Company.....	85
Splitdorf Electric Company.....	51
Standard Oil Company.....	62
Stearns, F. B., Company.....	4
Stewart-Warner Speedometer Corp.....	56a to 56d
Stromberg Motor Devices Company.....	77
Stutz Motor Car Company.....	45
Sulzberger & Sons Company.....	3
Thermoid Rubber Company.....	67
Trinity Bell Company.....	70
Twitchell Gauge Company.....	87
Van Sicklen Company.....	63
Warner Gear Company.....	66
Weston Electrical Instrument Company.....	72
Wheeler and Schebler.....	46
Willard Storage Battery Company.....	49
Winton Motor Car Company.....	77
Xcel-O-Lyte Company.....	74
Zenith Carburetor Company.....	85

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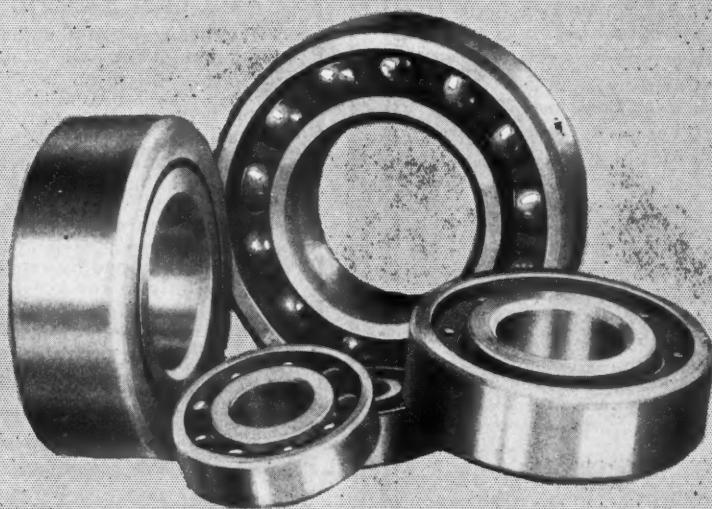
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